KAWEAH BASIN WATER QUALITY ASSOCIATION
SURFACE WATER MONITORING PLAN

AUGUST 6, 2014

Prepared for:

KAWEAH BASIN
WATER QUALITY ASSOCIATION

Prepared by:

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Visalia, California

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Kaweah Basin Water Quality Association

Prepared by:

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ABBREVIATIONS

Canal ..... Friant-Kern Canal
cfs ..... cubic feet per second
CVP ..... Central Valley Project
DPR ..... California Department of Pesticide Regulation
DWR ..... California Department of Water Resources
EPA ..... Environmental Protection Agency
General Order ..... General Order R5-2013-0120
GWPA ..... Groundwater Protection Area
ID ..... Irrigation District
ILRP ..... Irrigated Lands Regulatory Program
KBWQA ..... Kaweah Basin Water Quality Association
KDWCD ..... Kaweah Delta Water Conservation District
KSJRA ..... Kaweah & St. Johns River Association
MCL ..... Maximum Contaminant Level
MRP ..... Monitoring and Reporting Program
NOA ..... Notice of Applicability
NRCS ..... Natural Resource and Conservation Service
PUR ..... Pesticide Use Report
QAPP ..... Quality Assurance Project Plan
SSJVWQC ..... South San Joaquin Valley Water Quality Coalition
SWAMP ..... Surface Water Ambient Monitoring Program
SWMP ..... Surface Water Monitoring Plan
SQMP ..... Surface Water Quality Management Plan
TDS ..... Total Dissolved Solids
TIE ..... Toxicity Identification Evaluation
TOC ..... Total Organic Carbon
TSS ..... Total Suspended Solids
TMDL ..... Total Maximum Daily Load
Water Board ..... Central Valley Regional Water Quality Control Board
WQTL ..... Water Quality Trigger Limit

EXECUTIVE SUMMARY

The Kaweah and St. John's Rivers Association (**KSJRA**) was formed in 2002 as a sub-watershed of the Southern San Joaquin Valley Water Quality Coalition (**SSJVWQC**) to address surface water issues within the Kaweah basin. The SSJVWQC addresses water quality issues common to the sub-watersheds in the Tulare Lake Basin Area. The Central Valley Regional Water Quality Control Board (**Water Board**) adopted Waste Discharge Requirements for Growers within the Tulare Lake Basin Area that are a member of a Third-Party Group, Order No. R5-2013-0120 (**General Order**) on September 19, 2013. The Kaweah Basin Water Quality Association (**KBWQA**) was formed in October 2013 as a California non-profit mutual benefit corporation as the successor organization to the KSJRA, with the purpose of implementing the General Order Irrigated Lands Regulatory Program (**ILRP**) for its grower members. The KBWQA was authorized by the Water Board as the third-party group to represent growers within its service area by the Notice of Applicability (**NOA**) received on February 7, 2014.

This Surface Water Monitoring Plan (**SWMP**) is required by the General Order and was prepared with assistance from Water Board staff and former KSJRA staff, along with available documents from the surface water program.

KBWQA Area Description

The KBWQA covers the Kaweah River watershed from the Sierra Nevada Mountains to the valley floor in northern Tulare County within the Tulare Lake Basin. The Tulare Lake Basin is a closed-basin, separated from the Sacramento-San Joaquin Bay-Delta system. The KBWQA is comprised of the valley floor area as its Primary Area with a majority of the irrigated agricultural activity, while the foothill and mountain regions considered as the Supplemental Area due to significantly reduced agricultural activity.

The northern boundary roughly follows the Kaweah Delta Water Conservation District (**KDWCD**) northern border, but has been extended further north to include Stone Corral Irrigation District (**SCID**) and portions of Cottonwood Creek. The western boundary generally follows the Kings County Water District (**KCWD**) and Tulare Irrigation District (**TID**) borders. The southern boundary generally follows the KDWCD southern border, but approximately follows the Avenue 212 alignment as it heads towards the foothills. The Kaweah River watershed area is approximately 630 square miles above the foothill line in Tulare County. The Terminus Reservoir on Lake Kaweah, located about 20 miles east of Visalia, collects the majority of the tributary drainage area of about 560 square miles and produces about 95 percent of the total runoff of the watershed. In total, the KBWQA's service area approximately encompasses 950,000 acres.

Land Use and Management Practices

Irrigated agriculture is one of the largest land uses in the KBWQA, with an agricultural production value near $4 billion in 2013 in Tulare County. The top crops vary from tree and vines to row crops and include grapes, almonds, citrus, pistachios, hay, alfalfa and many others. Other uses in the KBWQA area include dairies, pasture lands, urban lands and natural lands.

Although a large area of the region is irrigated agriculture, much of the potential surface water quality risk is eliminated due to the management practices in place. Many of the growers in the area have implemented management practices in the area that are very innovative for both organic and

conventional farming. These techniques are effective in generating the most production out of their crops while being good stewards of various resources. Irrigation systems continue to improve with the adoption of sprinkler and micro-irrigation systems, resulting in the maximum benefit of water and a reduction of irrigation runoff. Land management practices have also been undertaken such as laser-leveled fields and farming on natural contours. Improved pesticide and fertilizer management practices are also being incorporated due to greater knowledge and understanding of integrated pest management and crop nutritional needs.

Potential Water Quality Problems, Pollutants and Effects

Agricultural surface water discharges within the KBWQA's boundary are very limited for a variety of reasons. The primary reasons are due to the scarcity and value of water and restrictions by agencies within the area that no longer allow direct discharges to surface water.

Past data collected by the Kaweah Sub-Watershed portion of the SSJVWQC has shown some issues with agriculturally related discharges of the pesticides Chlorpyrifos, Diuron, and Simazine. However, many of these issues appear to be resolved through improved management practices implemented in recent years as trends show a decline in the number exceedances at monitoring locations over the last three years. With the region dominated by irrigated agriculture, concern still remains for the potential exposure of waterways to the chemicals used. Continued monitoring, surface water quality management plan (**SQMP**) updates, and grower outreach by the KBWQA should continue to result in reductions of exceedances.

Surface Water Monitoring Plan Overview

The KBWQA and its Members are committed to continued development and implementation of a science-based water quality monitoring program designed to determine actual and potential impacts on water quality of surface water discharges from agricultural operations and on beneficial uses of water in its area. The KBWQA will continue to implement a monitoring strategy that utilizes the knowledge gained from the previous Monitoring and Reporting Program (**MRP**) and expands upon it to ensure that surface water beneficial uses are protected from degradation from agricultural operations.

This document represents the KBWQA's SWMP for the MRP requirement under Water Board Order No. R5-2013-0120. This KBWQA SWMP provides information that determines whether discharges are in compliance with the conditions of the Order, including compliance with applicable water quality standards. The monitoring strategy for the KRWCA SWMP is expected to primarily utilize Assessment Monitoring but may also include Core, Ephemeral and Special Project Monitoring, if necessary to properly classify waters in the future for the Kaweah Region.

Conclusions

The KBWQA intends to balance the success of agriculture within its boundary while also maintaining and improving the quality and sustainability of water resources. With the existing MRP in place, the KBWQA has the ability to address the Water Board's MRP Objectives by preliminarily answering the six questions set out in the Order.

1. Are receiving waters to which irrigated lands discharge meeting applicable water quality objectives and Basin Plan Provisions?

- ✓ Receiving waters of irrigation discharge regularly and consistently have been within standards provided by the State. Only a few problems related to agricultural operations have been encountered at the various monitoring locations and with continued monitoring and management through this SWMP and Order, this trend of reductions is expected to continue.

2. Are irrigated agricultural operations causing or contributing to identified water quality problems? If so, what are the specific factors or practices causing or contributing to the identified problems?

   - ✓ Sources from agricultural operations that may contribute to water quality problems include sediment transport and pesticide use. While exceedances in toxicity and some constituents have occurred, continued monitoring and investigation to determine specific causes is underway.

3. Are water quality conditions changing over time (e.g. degrading or improving as new management practices are implemented)?

   - ✓ Water quality conditions in the KBWQA area appear to be improving as new innovative management practices are implemented. Management practices, for the most part, have reduced agricultural discharges to surface waters, which in turn reduced the potential pollution from constituents. Continued monitoring and management should continue to improve water quality.

4. Are irrigated agricultural operations of Members compliant with the provisions of the Order?

   - ✓ Member irrigated agricultural practices are in compliance with provisions of the Order that have gone into effect. Surface water provisions have been implemented from previous MRP efforts. As additional provisions are implemented as part of the General Order, the KBWQA will educate members to continue to stay compliant.

5. Are implemented management practices effective in meeting applicable receiving water limitations?

   - ✓ The growers within the KBWQA have been implementing innovative management practices for some time. These practices contribute to the reduction and/or elimination of agricultural runoff from fields. Irrigation management, pesticide application, field and soil preparation, and harvest management practices all have improved.

6. Are applicable surface water quality management plans effective in addressing identified water quality problems?

   - ✓ Few issues, if any have been encountered through the surface water monitoring effort. For this reason, management plans have been fully implemented to address water quality issues. However, if and when problems do arise, the KBWQA believes it can develop effective surface water quality management plans.

The table below indicates the sections of this SWMP that address the MRP Requirement questions of the Order.

Table ES-1: Applicable SWMP Sections to Address MRP Requirement Questions

MRP Requirement	Requirement	SWMP Section Addressed
Q #1	Are receiving waters to which irrigated lands discharge meeting applicable water quality objectives and Basin Plan provisions?	2
Q #2	Are irrigated agricultural operations causing or contributing to identified water quality problems? If so, what are the specific factors or practices causing or contributing to the identified problems?	2, 3
Q #3	Are water quality conditions changing over time (e.g., degrading or improving as new management practices are implemented)?	2
Q #4	Are irrigated agricultural operations of Members in compliance with the provisions of this Order?	3
Q #5	Are implemented management practices effective in meeting applicable receiving water limitations?	2, 3
Q #6	Are the applicable surface water quality management plans effective in addressing identified water quality problems?	2, 8

1 INTRODUCTION

The Kaweah Basin Water Quality Association (**KBWQA**), a Third-Party Group covering land in portions of Tulare County, has prepared this Surface Water Monitoring Plan (**SWMP**) in accordance with the guidelines associated with the Monitoring and Reporting Program (**MRP**) of Order No. R5-2013-0120 Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area that are Members of a Third-Party Group (**General Order**). This SWMP will serve as the work plan for all aspects of the monitoring and reporting required by the Order to manage the quality of surface water within the KBWQA boundary as part of the Irrigated Lands Regulatory Program (**ILRP**).

1.1 Kaweah Basin Water Quality Association Background

The Kaweah and St. John's Rivers Association (**KSJRA**) was formed in 2002 as a sub-watershed of the Southern San Joaquin Valley Water Quality Coalition (**SSJVWQC**) to address surface water issues within the Kaweah basin. The SSJVWQC addresses water quality issues common to the sub-watersheds in the Tulare Lake Basin Area. The Central Valley Regional Water Quality Control Board (**Water Board**) adopted Waste Discharge Requirements for Growers within the Tulare Lake Basin Area that are a member of a Third-Party Group, Order No. R5-2013-0120 (**General Order**) on September 19, 2013. The Kaweah Basin Water Quality Association (**KBWQA**) was formed in October 2013 as a California non-profit mutual benefit corporation as the successor organization to the KSJRA, with the purpose of implementing the General Order Irrigated Lands Regulatory Program (**ILRP**) for its grower members. The KBWQA was authorized by the Water Board as the third-party group to represent growers within its service area by the Notice of Applicability (**NOA**) received on February 7, 2014.

1.1.1 Districts and Companies

Several public districts and private water companies are located within the KBWQA boundary. A list of the districts and companies can be found in **Table 1-1Error! Reference source not found.**. With the exception of Lindmore Irrigation District (**LID**), Lindsay-Strathmore Irrigation District (**LSID**), and Alta Irrigation District (**AID**), all listed districts and companies are fully encompassed in the KBWQA's boundary. Lindmore and Lindsay-Strathmore IDs extend outside the southeast edge of the boundary into the Tule Sub-Watershed. Alta ID extends outside the north boundary into the Kings River Sub-Watershed.

1.2 Description of Coalition Group Area

The KBWQA is primarily located in Tulare County. The eastern boundary is bounded by the Sierra Nevada Mountains that contains the watershed of the Kaweah River. The northern boundary roughly follows the Kaweah Delta Water Conservation District (**KDWCD**) northern border, but has been extended further north to include Stone Corral Irrigation District (**SCID**) and portions of Cottonwood Creek. The western boundary generally follows the Kings County Water District (**KCWD**) and Tulare Irrigation District (**TID**) borders. The southern boundary generally follows the KDWCD southern border, but approximately follows the Avenue 212 alignment as it heads towards the foothills.

Figure 1-1 is a map of the KBWQA area. The boundary area is divided into Primary and Supplemental areas. The Primary area, which contains almost all of the irrigated agriculture of the KBWQA, is approximately 356,000 acres. The Supplemental area, which primarily contains the mountainous

regions and little to no irrigated agriculture, is 602,000 acres. The total boundary covers approximately 958,000 acres, which puts the KBWQA as one of the smaller coalition areas that make up the South San Joaquin Valley Water Quality Coalition (**SSJVWQC**). The Kaweah River provides the majority of the surface water supply to the area, which is supplemented by groundwater extraction and imported surface water supplies. The KBWQA area is comprised of the Kaweah River, the St. Johns River, the Kaweah River watershed above the Valley floor and several minor foothill watersheds. Although a majority of Kaweah River water is diverted from the river and delivered to lands by way of canals and pipelines far from the river itself, some of this water is delivered within close proximity of the waterway. An extremely small portion of this water finds its way back into the river system as "agricultural discharge."

1.2.1 Kaweah River

The Kaweah River originates in the Sierra Nevada Mountains at an elevation of more than 12,000 feet and drains a watershed area of about 630 square miles above the foothill line. Terminus Reservoir, located about 20 miles east of Visalia, has a tributary drainage area of about 560 square miles and produces about 95 percent of the total runoff of the watershed. Dry (Limekiln) Creek and Yokohl Creek are tributaries entering the Kaweah River below Terminus Reservoir. Dry Creek has a sufficient amount of runoff generated to add to the flow of the Kaweah River, at least in the spring months, in all years. Yokohl Creek often does not flow year round and only has sufficient volume to reach the Kaweah system in years of above-normal precipitation.

Water in the Kaweah River is largely retained within the KDWCD and only in infrequent years of exceptionally large runoff are there any flows to the Tulare Lakebed. Since completion of Terminus Dam and Reservoir in 1962, seasonal storage of Kaweah River flows has been provided, which assists in regulation of runoff for irrigation demand schedules. Other than maintenance of a minimum pool for recreation, no carryover storage is provided in the reservoir.

At McKays Point, the Kaweah River divides into the St. Johns River and Lower Kaweah River branches. Water is diverted from the St. Johns and Lower Kaweah Rivers and distributed through a complex system of natural channels and canals owned or operated by numerous agencies and entitlement holders within the Kaweah River Basin, all of which have established rights to the use of water from the Kaweah River.

Flows in the Kaweah River have been continuously measured since 1903 at gauging stations near Three Rivers, located about 7 miles upstream from Terminus Reservoir. Completion of Terminus Dam and Reservoir in 1962 required the relocation of an existing gauging station and the establishment of two new upstream stations: 1) Kaweah River at Three Rivers, and 2) South Fork of Kaweah River near Three Rivers. The annual totals of measured flows at these two sites after 1962 continue the long-term record of Kaweah River near Three Rivers. During the period of record from 1903-04 through 1999-2000, the average annual flow was 432,928 AF, ranging from a minimum of 93,400 AF in 1976-77 to a maximum of 1,402,000 AF in 1982-83.

1.2.2 Creeks and Streams

Along with Dry and Yokohl Creeks, there are additional foothill watersheds (Sand Creek, Stokes Mountain, Cottonwood Creek and Lewis Creek) that have the potential to generate runoff which reaches

the Valley floor. These runoff conditions only exist during years of above normal precipitation conditions and/or during times of foothill-related flood conditions.

Flows from Sand Creek and Cottonwood Creek, if they exist in sufficient volume, intercept the Kaweah River system in the reach of Cross Creek just east of Highway 99. Flows from these watersheds are only sufficient in volume to reach Cross Creek on an approximate once-in-ten year basis. Flows from Stokes Mountain impact only the local Valley floor below the watershed. The principal impact is on the Friant-Kern Canal and the Redbanks area, located northeast of Ivanhoe.

The last foothill-level watershed with any potential impact on the valley floor is that of Lewis Creek. Lewis Creek enters the valley floor in the Lindsay area and courses to the northwest before eventually turning westerly and southwesterly. The natural channel on the valley floor has been eliminated and replaced with a man-made channel that is directed principally along property lines, eventually entering into the distribution system of the Farmers Ditch Company in the area of the Herbert Preserve, located southeasterly of Spinks Corner. Actions on the lands of the Herbert Preserve by the Sequoia Riverlands Trust are designed to allow Lewis Creek water to spread across the Trust property for beneficial use purposes and to mitigate downstream damage.

1.2.3 Friant-Kern Canal

The Friant-Kern Canal (**Canal**) flows from north to south near the eastern edge of the Valley floor, providing irrigation water for several federal water contractors in Tulare and Kings County. Surrounding lands slope gently from east to west. The Friant-Kern Canal's design is such that rainfall runoff from the eastern foothills is introduced into the Canal to reduce flooding risks and to augment surface water supplies.[1] A number of inlet drains are located within the KBWQA boundary, some of which appear to allow storm runoff from agricultural areas to enter the Canal. The federal Central Valley Project determines the policies and practices governing input of storm water into the Friant-Kern Canal. The KBWQA exercises no authority over the Friant-Kern Canal; thus it does not see the Canal as eligible for surface water monitoring. A sanitary survey of the Friant-Kern Canal was completed in 1998. The sanitary survey was updated in 2009.

Water districts and customers that receive water from the Friant-Kern Canal within the KBWQA primarily have either earthen channel or piped distribution systems. Water released to turnouts on the west side of the Canal is generally gravity fed (down-gradient), while turnouts on the east side of the Canal (up-gradient) are generally pressurized. At the southernmost point on the Friant-Kern Canal, it interties with the Kern River. During high flow events, excess Friant-Kern water is diverted into the Kern River channel in Bakersfield. The water is used for groundwater recharge in the Kern River channel or re-diverted downstream into large groundwater recharge facilities on the Kern River Fan (e.g., Kern Water Bank, Pioneer Banking Project, City of Bakersfield's 2800 Acres). In this manner, storm water intercepted into the Friant-Kern Canal can affect downstream beneficial uses.

[1] Keller-Wegley Engineering. 1998. Sanitary Survey for the Friant-Kern Canal, a report prepared for the Friant Water Users Authority

1.2.4 Soils

A wide variety of soil types cover the KBWQA boundary ranging from sand and silt alluvial deposits on the Valley floor in the Primary Area to rock in the mountainous Supplemental Area. Soils near the Kaweah River as it leaves Terminus Dam tend to be coarser textured, sandy soils and become finer as they spread over the Kaweah Delta on the Valley floor in the KBWQA. These alluvial soils are what have made the primary area of the KBWQA extremely adapt to agricultural production. Generally slopes in the primary area, where most agricultural activities occur, are flatter with slopes ranging from 0% to 2%. **Figure 1-2** is a map of the soils located in the Primary Area of the KBWQA. This figure shows the transition of soils as they follow the different waterways that move away from the Kaweah River.

1.2.5 Climate & Hydrology

The climate in the KBWQA can be defined as near desert, based on the amount of rainfall it receives. Desert regions are defined as receiving less than 10 inches of rainfall annually. The long-term average rainfall in the KBWQA is just above that limit at 10.26 inches, based on historical statistics for the City of Visalia. Nearly 80% of the rainfall occurs between November and March, when most crops are not being irrigated. Rainfall in summer months, when irrigation is at its highest is basically negligible. A summary of the temperature and precipitation for the Primary Area of the KBWQA is provided in **Table 1-2**.

Storm intensities are generally insufficient to induce large runoff, except from impervious surfaces such as roads and parking lots typical of urban infrastructure. On the Valley floor, average monthly rainfall during the wettest month of the year is only 1.94 inches, or an average of just over 0.06 inches per day. While rainfall intensities can vary, it is clear that generally, rainfall on the valley floor does not generate sufficient runoff volumes to be of concern.

Temperature in the KBWQA can be classified as hot summer months with mild to cool winter months. Irrigation is at its peak during the summer months when temperatures can easily surpass 100 °F during the day and crop evapo-transpiration is at its highest. Winter months are generally fairly mild, but temperature can drop below freezing during nights, which can become problematic for citrus growers in the KBWQA. Some citrus growers will apply groundwater during freezing conditions to raise the temperature of their fields to reduce crop frost damage.

1.2.6 Beneficial Uses

The Second Edition of the Tulare Lake Basin Plan (2004) was reviewed for listed surface water beneficial uses in the KBWQA. Now that the KBWQA Supplemental area includes the Kaweah River watershed in the mountainous regions of the Sierra Nevada Mountains, all beneficial uses (MUN through FRSH) are listed. **Table 1-3** depicts Table II-1 from the Basin Plan. However, since the primary focus of the General Order is impacts from irrigated commercial agriculture, only the beneficial uses below Lake Kaweah are listed since almost all agriculture in the KBWQA occurs in the primary area on the Valley floor. The beneficial uses below Lake Kaweah have been identified as:

1. MUN Municipal
2. AGR Agricultural Supply
3. IND Industrial Service Supply
4. PRO Industrial Process Supply
5. REC-1 Water Contact Recreation

6. REC-2 Non-Contact Water Recreation
7. WARM Warm Water Ecosystems
8. WILD Wildlife Habitat
9. GWR Groundwater Recharge

The waters of the Kaweah Basin are primarily used for AGR, REC-1, REC-2, WARM, WILD and GWR. Agricultural supply (**AGR**) represents the most prominent beneficial use within the KBWQA. Several agencies use surface water for groundwater recharge (**GWR**). Habitat and ecosystem benefits (WARM, WILD) are also realized during wetter years when water flows. Finally, REC-1 and REC-2 activities occur incidentally as a result of surface flows.

The beneficial use of MUN does not apply to the Kaweah River since none of the municipalities draw water directly from the river for drinking water usage. Currently, groundwater is used for domestic purposes. Mining occurs in the foothills on the eastern edge of the Primary Area that can potentially be classified for the IND beneficial use. No PRO uses have been identified in the Primary Area. POW is only used at Terminus Dam (Lake Kaweah) upstream of most agricultural operations.

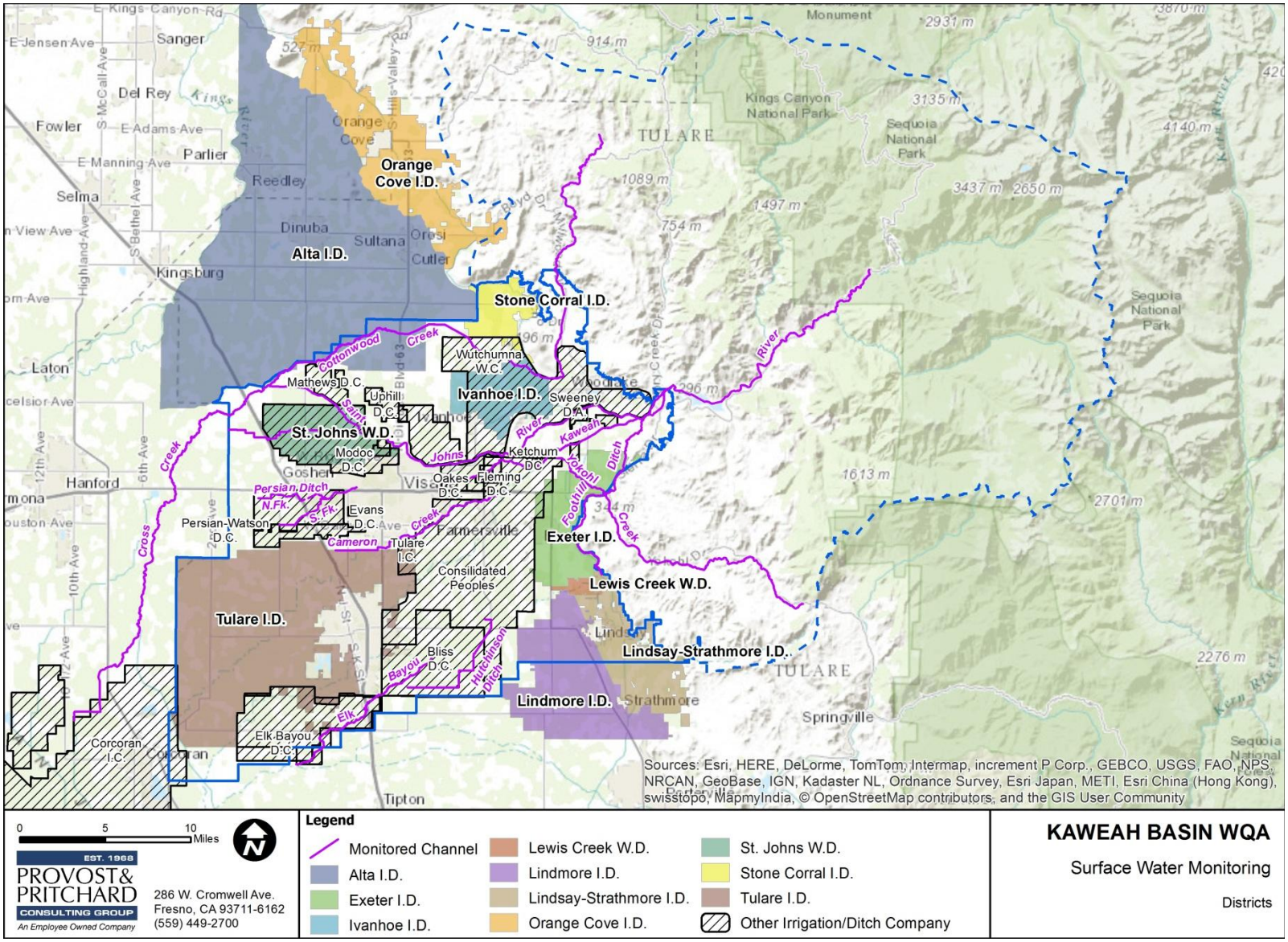

Figure 1-1: KBWQA Boundary Map

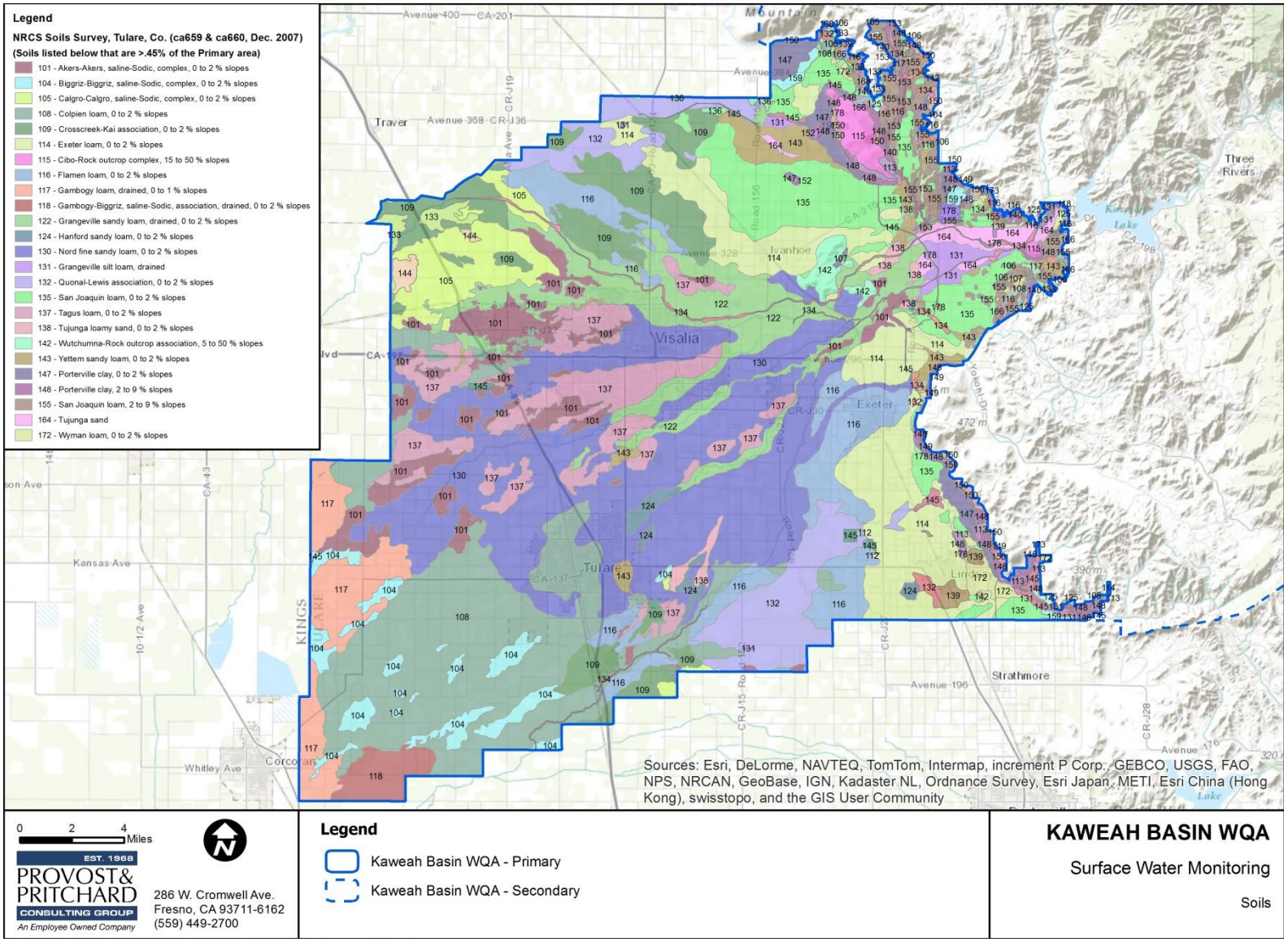

Figure 1-2: Soils of the KBWQA Primary Area

Table 1-1: Districts and Companies within the KBWQA

- Alta ID	- Bliss Ditch Co.	- Modoc Ditch Co.
- Exeter ID	- Consolidated Peoples Ditch Co.	- Oakes Ditch Co.
- Ivanhoe ID	- Elk Bayou Ditch Co.	- Persian-Watson Ditch Co.
- Lewis Creek ID	- Evans Ditch Co.	- St. Johns Ditch Co.
- Lindmore ID	- Fleming Ditch Co.	- Sweeney Ditch Area
- Lindsay-Strathmore ID	- Hamilton Ditch Co.	- Tulare Irrigation Co.
- St. Johns WD	- Ketchum Ditch Co.	- Uphill Ditch Co.
- Stone Corral ID	- Longs Canal Area	- Wutchumna Water Co.
- Tulare ID	- Mathews Ditch Co.	

Table 1-2: Climate Statistics for the KBWQA Primary Area (based on Visalia, CA records)

Month	Average High Temp. (°F)	Highest Temp. on Record (°F)	Average Low Temp. (°F)	Lowest Temp. on Record (°F)	Avg. Precip. (in)
January	54.6	79	38.7	20	1.94
February	61.3	87	42.1	24	1.88
March	67.3	90	46.1	27	1.72
April	73.4	99	49.2	32	0.98
May	81.6	108	55.7	37	0.33
June	89.1	111	61.6	42	0.09
July	94.1	115	66.7	50	0.01
August	92.8	115	65.0	49	0.01
September	87.7	110	60.3	39	0.13
October	78.2	104	52.5	31	0.51
November	64.1	94	43.5	26	1.03
December	54.5	80	37.8	21	1.62
Total	**75.0**	**--**	**51.6**	**--**	**10.26**

Table 1-3: Beneficial Uses in the Tulare Lake Basin Plan (2004)

TABLE II-1
TULARE LAKE BASIN
SURFACE WATER BENEFICIAL USES

Stream	MUN	AGR	IND	PRO	POW	REC-1	REC-2	WARM	COLD	WILD	RARE	SPWN	GWR	FRSH
552, 551 Kings River														
North Fork, Upper					•	•	•	•	•	•	•	•		•
Main Fork, Above Kirch Flat	•					•	•	•	•	•	•	•		•
Kirch Flat to Pine Flat Dam (Pine Flat Reservoir)					•	•	•	•	•	•				•
Pine Flat Dam to Friant-Kern	•	•			•	•	•	•	•	•		•	•	•
Friant Kern to Peoples Weir	•	•		•		•	•	•		•			•	
Peoples Weir to Stinson Weir on North Fork and to Empire Weir No. 2 on South Fork		•				•	•	•		•			•	
553, 558 Kaweah River														
Above Lake Kaweah	•				•	•	•	•	•	•	•	•		•
Lake Kaweah					•	•	•	•		•				•
Below Lake Kaweah	•	•	•	•		•	•	•		•			•	
555, 558 Tule River														
Above Lake Success	•	•			•	•	•	•	•	•	•	•		•
Lake Success		•			•	•	•	•		•				•
Below Lake Success	•	•	•	•		•	•	•		•			•	
554, 557 Kern River														
Above Lake Isabella	•				•	•	•	•	•	•	•	•		•
Lake Isabella					•	•	•	•	•	•				•
Lake Isabella to KR-1‡					•	•	•	•	•	•	•			
Below KR-1‡	•	•	•	•	•	•	•	•		•	•		•	
555, 558 Poso Creek		•				•	•	•	•	•			•	•
552 Mill Creek, Source to Kings River	•					•	•	•		•			•	•
552, 553, 554, 555 Other East Side Streams	•	•				•	•	•	•	•			•	
556, 559 West Side Streams		•	•	•		•	•	•		•	•		•	
551, 557, 558 Valley Floor Waters		•	•	•		•	•	•		•	•		•	

‡ KR-1: Southern California Edison Kern River Powerhouse No. 1.

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2 SURFACE WATER QUALITY STATUS

Surface water quality has been monitored by several sources in an effort to characterize watersheds and quantify constituent concentrations. Sources have included the Environmental Protection Agency (**EPA**), California Department of Pesticide Regulation (**DPR**), and recently Third-party members like the KBWQA. The data collected has allowed for the determination of the current status and general trends of surface water quality. This previously collected data will be used to set a quality starting point for this Surface Water Monitoring Plan and will aid in determining the plan's effectiveness moving forward.

2.1 Current Status

Ten water bodies in the KBWQA boundary were listed on the 2010 EPA 303(d) list of impaired water bodies. These water bodies are summarized in **Table 2-1**. Listings primarily pertain to unknown toxicity, but also include pesticides Chlorpyrifos and Dimethoate, the metal mercury, and two listings for pH. For most listed water bodies, the source of the pollutant is unknown. Agriculture is the listed source for the pesticide pollutants on Elbow Creek and Elk Bayou. The KBWQA has already implemented monitoring locations on or near these sites and are continuing sampling for these parameters. The mercury listing caused by resource extraction for Lake Kaweah further bolsters the argument of the KBWQA that there are little to no agricultural operations in the mountainous Supplemental Area and it has little to no impact on these water bodies.

The DPR's Surface Water Database was reviewed by the KBWQA for sampling information of pesticides in the KBWQA boundary area. This database search found results for KBWQA monitoring sites between the years of 2005 and 2011. The search reviewed all results of all parameters to determine if any significant issues had occurred through previous monitoring efforts. Over 1,100 results were found in the database and of these results only 65 (5.9%) were exceedances. With such a small percentage of exceedances over the seven years of results, the KBWQA believes the current surface water quality status is very good. Closer examination was done on Chlorpyrifos, Diazinon, Diuron, Glyphosate, and Simazine. 128 samples for Chlorpyrifos were analyzed of which 8 (6.3%) had an exceedance. Diazinon samples were collected 137 times and the database listed no exceedances. Diuron was sampled 131 times and had 24 (18.3%) exceedances. Glyphosate and Simazine were sampled 116 times and each had 10 (8.6%) exceedances. Diuron exceedances were the largest issue in the KBWQA, but the majority of the exceedances occurred at one monitoring site.

Surface water sampling for the Kaweah Sub-Watershed began in 2005 under the direction of the SSJVWQC. Sampling under the original program is very similar to current program and included several constituents such as: field and physical parameters, metals, pesticides, and water column and sediment toxicity. This initial monitoring was performed during the winter storm season and summer irrigation season for six sites in the Kaweah Basin area, sites SP-1 through SP-6. An additional six sites were incorporated into the monitoring in 2011. All 12 locations are still located within the KBWQA Boundary and more information on each site is provided in Section 4.

Results collected from these sites initially indicated that pathogens, metals, pesticides, and toxicity could be an issue. However, when reviewing more recent data (past three years), the exceedances have been decreasing. These decreases have been due to lack of surface water and discharge to surface water bodies brought about from improved management practices. 2011 saw a large increase in exceedances because the number of sites doubled in this year. Increased exceedances brought more awareness to growers in the area and lead to the improvement of management practices to try and eliminate the

contamination. The KBWQA believes this trend continues to improve towards satisfying both the MRP requirements and protect surface water resources.

2.2 Monitoring Trends

As previously stated, the Kaweah Sub-Watershed has not seen a significant amount of exceedances in regard to number of samples taken, when reviewing the past monitoring data. The KBWQA did see a sharp rise in exceedances in 2011 when additional monitoring sites were added, but since their inclusion, management practices have been made more efficient and resulted in a reduction of these exceedances. The improved management practices have not only benefited surface water resources and other uses, but have also helped growers use water more efficiently as water supplies have been reduced. **Figure 2-1** shows the total exceedances during the monitoring years from 2007 to 2014. The KBWQA expects the reduced number of exceedances to continue as the monitoring program continues.

Exceedances did trigger the need for Surface Water Quality Management Plans (**SQMPs**) to be developed. The KBWQA expects to work with the Water Board to update and approve SQMPs for sites with issues that still need to be addressed. For sites with low priority issues, or where there is no longer an issue, documentation for changes and outreach will be provided to the Water Board. Monitoring through the proposed prioritization schedule (Section 5) will still allow the KBWQA to determine effectiveness of management practices and whether changes need to be made.

2.3 Potential Discharge Sources

Possible sources for potential discharges include: agricultural irrigation discharge and drainage, agricultural storm water discharge, and urban runoff. Generally, depths to groundwater do not allow for groundwater discharge to surface water except near areas in the foothills and mountains along the Kaweah River. At these locations irrigated agriculture is not very intensive as there are more unirrigated range lands present. With this SWMP pertaining to irrigated lands, the focus will be on the agricultural irrigation and storm water discharges. However, if in the future exceedances or degradation appear to be caused by sources other than agricultural activities, urban and other potential sources will be reviewed.

2.3.1 Agricultural Drainage

Agricultural discharges can impact water quality by directly discharging water containing constituents in excess of the trigger limits to a surface water body or operationally through methods such as spray drift. Most water districts and ditch companies in the KBWQA do not allow growers to discharge water into conveyance facilities and surface water bodies. This requires growers to contain irrigation water on their property, reducing the potential for agricultural discharges. However, potential discharges can occur if control is lost on a system. These tend to be rare occurrences that are short in duration. For locations that do have an agricultural discharge into a surface water body, generally there is a monitoring site located downstream to track for pollutants.

2.3.2 Storm Water Runoff

Storm water discharges have the potential occur during the winter season when storms are more likely to occur in the KBWQA area. Although most farmers in the area have facilities in place to contain water on their property, the duration and intensity of a storm and proximity to a surface water body can potentially lead to storm water runoff discharging into a surface water resource. Roads can also be a

conduit for taking storm runoff towards a surface water body. Runoff discharges and flooding are more likely to occur during large events that containment infrastructure cannot handle. At these times there is potential for water to flow across agriculture and back into a surface water body possibly causing constituent exceedances. If flooding occurs often enough to trigger Surface Water Quality Management Plans, then management practices and improvements to control flooding will be incorporated into the SQMP implementation plan to prevent future exceedances.

Table 2-1: 2010 EPA 303(d) Listed Water Bodies in the KBWQA

WATER BODY NAME	POLLUTANT	POTENTIAL SOURCES	SOURCE CATEGORY
Bates Slough (from Avenue 200 to Deep Creek, Tulare County)	Unknown Toxicity	Source Unknown	Source Unknown
Cross Creek (Kings and Tulare Counties)	Unknown Toxicity	Source Unknown	Source Unknown
Elbow Creek (from Mathews Ditch to Cottonwood Creek, Tulare County)	Chlorpyrifos	Agriculture	Agriculture
Elk Bayou (Tulare County)	Chlorpyrifos	Agriculture	Agriculture
	Dimethoate	Agriculture	Agriculture
	pH (high)	Source Unknown	Source Unknown
	Unknown Toxicity	Source Unknown	Source Unknown
Kaweah Lake	Mercury	Resource Extraction	Resource Extraction
Kaweah River (below Terminus Dam, Tulare County)	pH	Source Unknown	Source Unknown
	Unknown Toxicity	Source Unknown	Source Unknown
Kaweah River, Lower (includes St Johns River)	Unknown Toxicity	Source Unknown	Source Unknown
Mill Creek (Tulare County)	Unknown Toxicity	Source Unknown	Source Unknown
Outside Creek (Tulare County)	Unknown Toxicity	Source Unknown	Source Unknown
Packwood Creek (Tulare County)	Unknown Toxicity	Source Unknown	Source Unknown

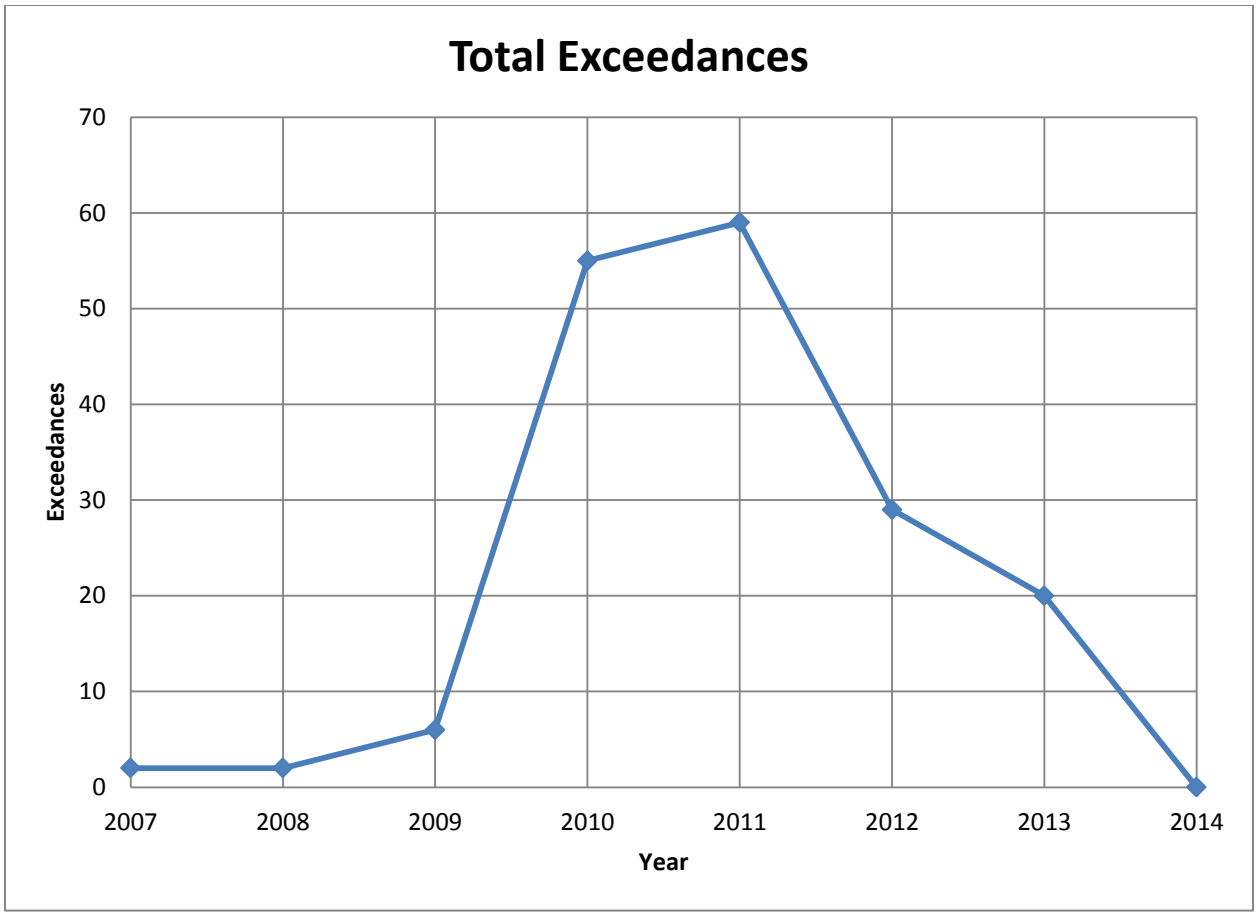

Figure 2-1: KBWQA Total Exceedances in Monitoring Results

3 AGRICULTURAL MANAGEMENT PRACTICES

Numerous management practices exist in the KBWQA due to wide variety of crops grown in the area. These on-farm management practices are beneficial for growers since they help maximize the efficient use of their resources while maintaining crop production. KBWQA growers have been innovative over the years in developing and using better practices in water efficiency, soil management, and pesticide and fertilizer application.

3.1 Management Practices Trends

Management practices in the Kaweah Basin have improved in efficiency as water supplies have decreased and available technology has increased. These practices have a two-fold benefit as they not only help the grower with increased production from efficient resource use, but also reduce pollutant discharges from reaching surface water bodies. Growers have implemented, and continue to implement, better application practices of water, pesticides, and fertilizer along with soil enhancement and control for both organic and conventional farming practices.

3.1.1 Water Application Practices

Surface water deliveries typically occur March through September or October, depending upon crop demand and surface water availability. In some years, an irrigation or water district may not receive any surface water due to the hydrologic conditions of the source supply. Regardless of the water year, most often surface water supplies are not so plentiful that a grower can irrigate a field to the point of generating significant discharges.

Irrigation practices are increasing in efficiency, as the cost of pumping water and the reduction in available surface supplies impact growers' production. Many permanent crops have converted to drip or micro-sprayer irrigation systems and application rates are being more closely matched to a crop's water usage, reducing the amount of water that can potentially be lost to runoff or below the root zone as deep percolation. However, this efficiency comes at risk with soil salinity concentrations increasing as less water is applied to leach these salts below the root zone.

Improvements to water application practices have not only benefited production but have also led to the reduction of field runoff that could potentially discharge pesticides and other pollutants. These improved systems for water control and efficient water application include: regulation and measuring devices, check structures, turnouts, and control gates and valves. Benefits of these improvements in water application can potentially allow for:

- Reduction in volume of water applied to refill the crop root zone.
- Change in the amount, rate, or timing of water being applied to the crop that leads to improved efficiency and no loss of crop production.
- Reduction of erosion caused by irrigation.
- Increased distribution uniformity of applied water.
- Changes in flow rates to compensate for changes in intake rates.
- Installation of one or more structural components that improve irrigation efficiency.

The addition of irrigation water additives may have the potential for reducing pesticides in the tail water by increasing infiltration during irrigation events, which also reduces erosion, and reduces the amount of

pesticides that adhere to particulates by promoting the aggregation of dispersed soil colloids. These water additives are primarily added to irrigation water for erosion control and/or improved water infiltration. Examples of additives include polyacrylamide (**PAM**), gypsum, and humic acid.

In the Primary Area of the KBWQA, general topography of the irrigated lands is flat to gently sloping, so furrow and surface irrigation is still practiced in various areas. A large majority of surface irrigated fields are now laser leveled providing improved distribution uniformity and reducing runoff. Many growers rely on pumped groundwater, and because of significantly increased energy costs for pumping (e.g. time of use and demand charges for electricity), they are not running their irrigation pumps any longer than necessary to properly irrigate their lands.

Some growers have extensive tail water recovery systems, where they collect, store, and transport irrigation tail water for reuse back into their irrigation distribution system. These systems are suitable for use on sloping lands with surface irrigation systems or for use in areas where there is recoverable irrigation runoff flow or where such flows can be expected under the management practices used. Many growers have switched to tail water systems since monitoring went into place under the previous Conditional Waiver.

The Kaweah and St. John's Rivers Association that originally managed the Kaweah Sub-Watershed found some locations with the potential to discharge runoff into surface water bodies. As monitoring results came back indicating exceedances, an effort to educate growers resulted in many of the discharge culvert pipes being removed, and management practices improved.

3.1.2 Soil Enhancement and Control

Reduced tillage practices (for example cover crops in orchard middles) are being adopted by some growers along with the use of GPS-guided equipment. Increases in fuel costs are dictating less ground preparation which is leaving soil surfaces undisturbed for longer periods of time. Raised berms at low ends of fields trap sediment as well as suspended or adsorbed pesticides, and reduce runoff of dissolved substances in fields with low slopes and sandy soil types by holding water, increasing runoff water retention and allowing for infiltration. This is potentially applicable for both dormant and irrigation seasons.

Water and sediment control basins are used to form a sediment trap and water detention basin. Their purpose is to reduce erosion, trap sediment and pesticides attached to soil particles, reduce and manage runoff, change the flow of nutrients and pesticides, and improve water quality. The control basin can be an earthen embankment or a combination ridge and channel. It is generally constructed across the slope and drainage way to form a sediment trap and water detention basin. The basins serve to increase residence time by temporarily storing runoff on-site. The basin releases water slowly, through infiltration or a pipe outlet and tile line. The increased residence time allows suspended particles to settle out, resulting in better water quality. Water and sediment control basins are applicable to both dormant and irrigation seasons.

Buffers are areas of land located along field edges that are maintained in permanent vegetation. The vegetation and soil buildup in buffers slow water movement and increase infiltration. By slowing its movement, field runoff is more likely to infiltrate into soil, carrying with it dissolved pesticides and nutrients. Properly designed buffers also trap sediment, thereby reducing the offsite movement of pesticides adsorbed to soil particles. Microbes residing in soil and organic matter can then degrade pesticides that infiltrate into the upper soil layer or are trapped by vegetation and plant debris.

Orchard and vineyard residues are now being shredded on site at a greater rate since the ban on agricultural waste burning has gone into effect. The crop residues are being reincorporated into the soil structure, where they help to reduce runoff from the soils. This is most beneficial during the winter months. The usage of composted materials is rising as well due to their benefits on soil biota.

Various vegetation management practices help reduce pesticide runoff by increasing soil infiltration, accelerating pesticide degradation at the soil surface and preventing the offsite movement of soil, nutrient, and pesticides during winter storm events. Cover crops can reduce pesticide runoff because pesticide particles are adsorbed to plant surfaces more readily than to bare soil, pesticide persistence on plant surfaces is shorter than on or in soil, and because cover crops slow or prevent the off-site movement of water and sediment carrying pesticides. There are many types of cover crops, but they can be considered in two main groups: resident vegetation and seeded cover crops. Cover crops are not usually harvested for sale, but can provide several important functions:

- Anchor the soil during winter rains to prevent soil, nutrient, and pesticide runoff.
- Accelerate biodegradation of pesticides at the soil surface.
- Improve water infiltration and soil structure.
- Provide nitrogen (legumes).
- Add organic material to the soil.
- Help control weeds.
- Improve field access during wet weather.
- Provide nectar and habitat for beneficial insects.

Soil management is another component of controlling pesticides. Tillage is the term used for soil mechanical cultivation activities such as plowing, ripping, disking, aerating, and harrowing. These tillage practices are specifically designed to loosen soil, direct water flow, and encourage vegetation growth. If properly conducted, tillage can dramatically reduce runoff and increase infiltration. The effects of tillage on offsite pesticide movement depends greatly upon the specific tillage technique used, soil type, slope, soil organic matter, and a number of other site specific factors. Ripping is commonly used on fields to increase water infiltration. For orchards, shank depth must be shallow enough to avoid damage to tree roots. Ripping significantly increases the infiltration rate of soils within the rootzone and can render fields impassable to heavy equipment such as sprayers used during dormant treatments. Aerating orchard soils with specialized tillage equipment is another way to increase water infiltration. Aeration improves the soil profile with minimal disruption to the orchard floor. A finishing process may be required; however, for almond orchards where shake and sweep harvest methods are used. Aeration, therefore, may reduce pesticide runoff although no studies have been conducted.

3.1.3 Pesticide Application

Integrated pest management (**IPM**) has been gaining traction within the KBWQA as a means of controlling costs. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, use of predatory insects (e.g. ladybugs for aphids), use of softer selective pesticides, mating disruption pheromones, and use of disease resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. The advent of “softer” materials (more pest specific, less broad

spectrum) has further reduced both the frequency and volume of material applications, as now only the target pest is eliminated when a predetermined economic threshold is reached.

Management methods vary, and can be a combination of one or more aspects including biological control, cultural practices, pheromone disruption, pesticide treatment, etc. Biological control includes the use of natural enemies that attack pests. Use of such biological control agents, however, may not be enough to suppress pest populations to prevent them from reaching damaging levels. Cultural practices include field level practices that can affect the intensity of pest infestation. This includes practices such as orchard sanitation or proper pruning and painting of exposed wood to prevent sunburn as well as reduce tree susceptibility to wood-boring insects. Proper irrigation and fertilization may also help reduce certain pests.

Spray control practices have improved with many growers. Many growers have the applications performed by a customer applicator and these operations recognize the benefits of higher efficiency spray equipment, as they are paid by the acres sprayed, not by the time it takes to do the work. Efficient spray equipment means that individual fields can be covered quicker, and more acres can be done per working day. With the use of target sensor recognition applicators, chemical costs are reduced due to only mixing what is needed to spray the crop, not the open spaces between the plants (net vs. gross acres). Orchards and row crops both benefit from such equipment.

3.1.4 Fertilizer Application

Fertilizer applications are also becoming more efficient. Soil nutrient levels are typically tested during the winter months. Plant tissues are sampled for nutrient levels frequently during the growing season, and many plant nutrients are direct injected into micro irrigation systems or applied as a foliar spray. Some fertilizers are applied as banded applications within orchards, and are quickly incorporated by a following irrigation. Others are direct injected into planting beds for quick uptake by the soon to be planted crops.

Greater knowledge and education on the amount, type of, and application timing of fertilizers has occurred by crop, from the University of California Ag Extension Service. For example, excess applications of nitrogen on stone fruit can lead to increased brown rot and excess nitrogen can also cause some crops to grow more vegetation but reduce fruit set. This knowledge has helped to improve timing and reduce fertilizer applications on some crops.

3.2 Management Practices and Land Use

Management practices in use largely depend on the land use or crop on a particular site. Agriculture in the KBWQA is very diverse and accounts for one of the largest land uses in the KBWQA area. **Figure 3-1** spatially shows the crop variety over the KBWQA boundary area. Reviewing the Tulare County Agricultural Commissioner's 2013 Annual Crop Report, eight of the top ten commodities are crops. These top crops also show the success and variety that make up much of the farming in the KBWQA as there are vine and tree crops and row crops listed. **Table 3-1** is a summary of the top ten commodities in Tulare County for 2013. In total Tulare County growers produce more than 100 commodities and export to over 80 countries throughout the world. For reference, the complete 2013 Annual Crop Report is included in **Appendix A**.

Management practices tend to vary by crop, but as a whole the management practices going into effect are better at efficiently using several resources such as irrigation water, pesticides, and fertilizers. Many

of these practices began to be implemented after California Department of Pesticide Regulation issued management practice requirements for groundwater protection areas (**GWPAs**) that need to be used in order to obtain permits for applications of various pesticides. These management practices fall under two GWPA categories: runoff and leaching. Many of the runoff management practices have gone into effect in the KBWQA area, especially with the citrus crops. General descriptions of management practices in use for citrus, tree, and row crops are provided, the primary crop categories from the 2012 Tulare County Annual Crop Report.

Citrus growers have shifted to irrigation practices from flood to almost primarily drip and microsprinkler to increase efficiency in water use and better control of delivery. Soil cover practices for citrus growers range from use of a practice known as "clean middles" or no vegetation between rows for cold air drainage, to planted grasses to improve erosion and runoff control. Pesticides are primarily applied in two methods: 1) air or foliar applications into the canopy, or 2) applied on the surface near the base. Fertilizers can also be applied to the ground or mixed into the irrigation water for uptake through the roots.

Tree crop irrigation practices in use are primarily furrow or micro sprayer methods. Some tree crops also have double drip lines (two drip lines per row of trees) laying on the ground in an orchard. Soil practices in use are minimum, or no-till, practices that enhance water penetration. Typical pesticide applications are through the use of air sprayers into the tree canopy. Like citrus, fertilizers are applied either in bands on the surface or mixed with the irrigation water.

Row crop irrigation practices tend to be furrows with methods of collecting and reusing water than makes it past the field. There has also been an increase in the use of sprinklers. Pesticides are either applied through the sprayers either in the air (crop dusting) or with ground equipment. Fertilizer can be applied by ground application or mixed with the irrigation water.

3.3 Future Management Practice Implementation

As surface water monitoring moves forward exceedances of constituent trigger limits have the potential to occur and possibly lead to implementation of a management plan. As these instances or other learning opportunities occur, the KBWQA and its grower members will determine exceedance sources and the solutions to stop and/or reverse these sources. When successful, site-specific management practices are discovered, these practices will be shared with growers through various outreach, education, and implementation efforts. Growers have been very proactive in implementing the best management practices on their farms as it leads to higher sustainability and efficiency. The KBWQA, in an effort to continue this trend, will document successful management practices and promote those growers who have had success with implementation and reduced potential of polluting surface water. Successful management practices are expected to range from on-farm facility modification, changing chemicals, soil management, and/or methods of application (i.e. timing, nozzle calibration, etc.).

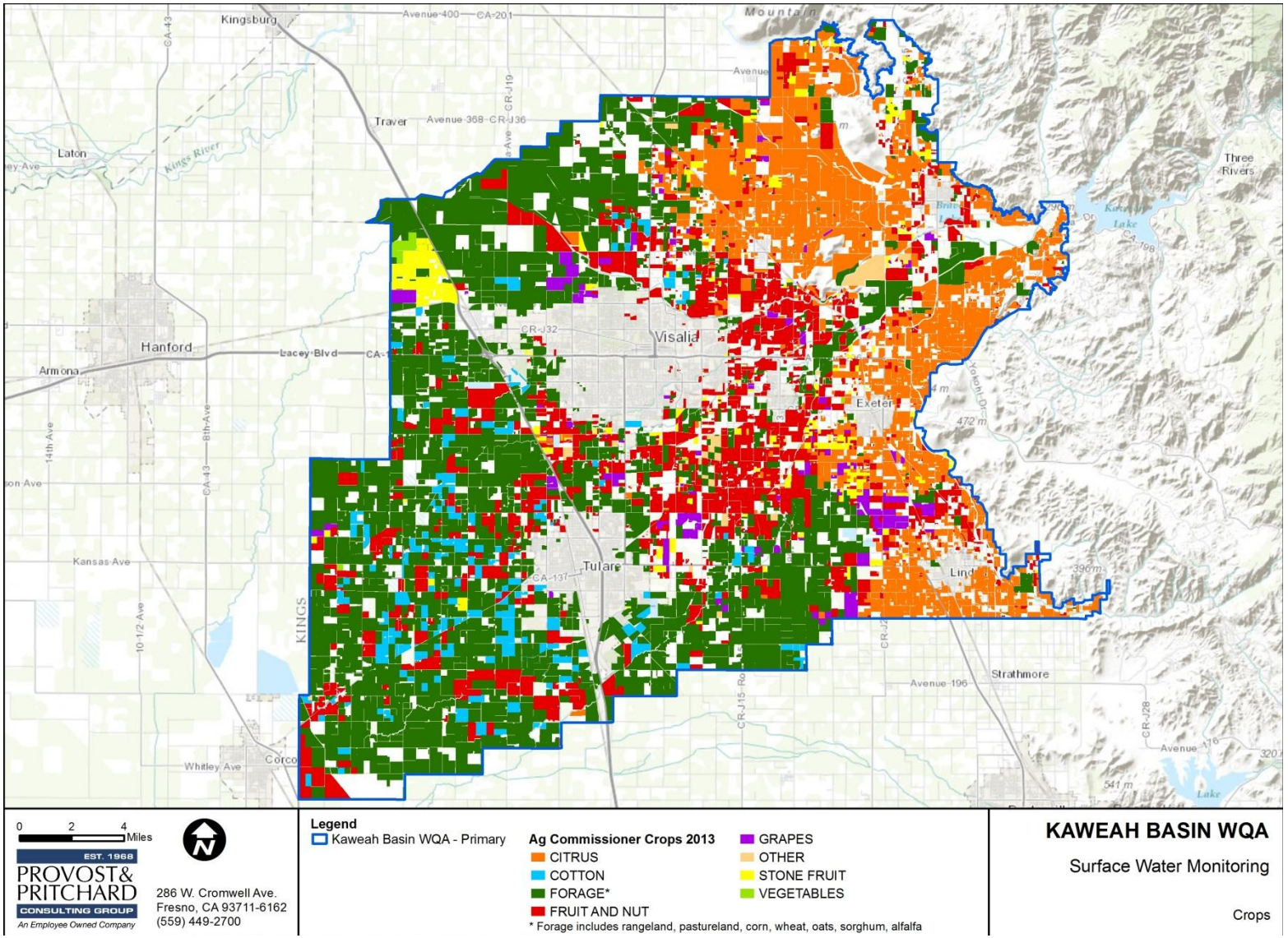

Figure 3-1: KBWQA Primary Area Crop Map (2013)

Table 3-1: 2013 Top 10 Tulare Commodities

Tulare County
10 Leading Commodities
2013

	Commodity		Value	2012 Rank
1	Milk	$	2,083,354,000	1
2	Grapes	$	984,879,000	2
3	Oranges-Navel, Valencia	$	854,693,000	3
4	Cattle & Calves	$	687,960,000	4
5	Pistachio Nuts	$	271,206,000	7
6	Walnuts	$	262,094,000	9
7	Almonds-Meats, Hulls	$	256,516,000	8
8	Corn-Grain, Silage	$	256,218,000	5
9	Nectarines	$	234,900,000	13
10	Alfalfa-Hay, Silage	$	175,598,000	6
Top 10 Total		**$**	**6,067,418,000**	

Source: Tulare County Annual Crop Report 2013

4 SURFACE WATER MONITORING SITE SELECTION & RATIONALE

Four different monitoring sites types are available for use by the KBWQA for the surface water monitoring effort. These sites are listed as: 1) fixed, long-term core sites, 2) assessment sites, 3) ephemeral sites, and 4) special project sites. The KBWQA will primarily use Assessment sites for complying with the Surface Water portion of the MRP, but language is provided for all site types as to how they may be incorporated into the KBWQA monitoring strategy in the future.

4.1 Proposed Assessment Monitoring Sites

The KBWQA's monitoring sites were developed under the previous conditional waiver (R5-2008-0005). The KBWQA plans to continue the use of these sites to develop data for water quality trend purposes as the impact of agricultural activities is continued to be evaluated. **Table 4-1** lists the Assessment Monitoring sites. The rationale for each Assessment Site is described below. All sites in the KBWQA are proposed to be utilized as Assessment Monitoring sites. A rotating prioritization schedule has been established that the KBWQA plans to follow. The prioritization and use of Assessment Monitoring will allow for all parameters to be analyzed while keeping costs reasonable for the KBWQA Members. Further detail on the site prioritization and schedule is available in Section 5. The parameters that will be monitored are discussed in Section 6. **Figure 4-1** shows each sites respective location within in the KBWQA.

Table 4-1: KBWQA Assessment Monitoring Sites

Monitoring Site	Latitude	Longitude	Site Code
Kaweah River (SP-1)	36.33821	119.22050	558KRWSP1
St. Johns River (SP-2)	36.35394	119.28139	558SJRSP2
Stone Corral ID (SP-3)	36.45683	119.22334	558SCDSP3
Cross Creek (SP-4)	36.40727	119.45415	558CCRSP4
Elk Bayou (SP-5)	36.15286	119.31740	558ELKSP5
Goshen Ditch (SP-6)	36.37075	119.42887	558GSDSP6
Cameron Creek #1 (CC1)	36.31693	119.22460	558CAMCC1
Cameron Creek #2 (CC2)	36.28279	119.30566	558CAMCC2
Foothill Ditch (FD)	36.32474	119.07916	558FDSPFD
Lewis Creek (LC)	36.21094	119.19869	558LEWCLC
Watson-Persian Ditch (WPD)	36.32640	119.35397	558WATWPD
Wutchumna Spill (WS)	36.45015	119.21851	558WTCHWS

4.1.1 Kaweah River (SP-1)

SP-1 is located immediately upstream of Oakes Basin at the end of the Kaweah River. The sampling point is just upstream of where the Lower Kaweah River bifurcates into Mill Creek and Packwood Creek. Access to the site is from Road 158 and is located approximately one mile north of Highway 198.

During development of the MRP under the previous conditional waiver, SP-1 was chosen based on its potential to demonstrate if any adverse impacts to water quality have occurred as waters are conveyed in the Lower Kaweah River at a site upstream of the urban discharges. The sample location has provided a twofold opportunity. First, the location is sited downstream of primarily pasture field crops and deciduous fruit and nut trees. There are, however, currently no identified agricultural discharges into this stretch of water and, thus, the potential to monitor a known impaired source to determine its downstream impact does not exist. The sampling point allows for a determination of the existence of any contaminant and, if contamination was found, progressive samples can occur in an upstream fashion to McKay Point and then to Terminus Dam to allow for a determination of the source of contamination. Second, the sample location also establishes baseline water quality for downstream locations.

4.1.2 St. Johns River (SP-2)

SP-2 is located north of the City of Visalia at the crossing of Ben Maddox Way and the St. Johns River. The sampling site is downstream of the bridge crossing, but prior to the diversion dam serving the Modoc Ditch Company head gate. Agricultural uses upstream of this location have consisted of fruit and nut trees, field crops and commercial landscape nurseries.

SP-2 was originally chosen to allow for sampling of the only identified agricultural discharge to the St. Johns River. The sampling site is below the point where the Wutchumna Water Company has operational spill capability into the St. Johns River. Thus a sample taken at this location, if taken during an operational spill period, would have the capability to demonstrate any adverse effects of that discharge on this portion of the St Johns River. Should it be determined that identified contamination is not from this source, then sampling could continue upstream on the St. Johns River to McKay Point to determine the specific source of the contamination. If contamination was introduced between McKay Point and Terminus Reservoir, results of such contamination should be evident at both SP-1 and SP-2.

4.1.3 Stone Corral Irrigation District (SP-3)

SP-3 is a sampling point designed specifically to test the water quality of the discharge from the Stone Corral Irrigation District's Storm Water Control Project. The sampling point is located along the east right-of-way line of Road 156 just north of the Cottonwood Creek bridge crossing.

SP-3 was located specifically to test the storm water control project impacts of the discharges from lands within Stone Corral Irrigation District on the waters of Cottonwood Creek. The agriculture uses within the Stone Corral Irrigation District consists primarily of citrus crops. If flows in Cottonwood Creek were sufficient, the potential impact on Cross Creek could also be determined. Sampling at this location is conducted only when subterranean discharges and/or subterranean combined with surface water discharges were being produced by lands within the Stone Corral Irrigation District.

4.1.4 Cross Creek (SP-4)

SP-4 is designed to sample the waters being conveyed in Cross Creek. The sampling location is located 500 feet upstream of the railroad tracks east of Highway 99.

SP-4 was chosen to test waters in Cross Creek downstream of the introduction of influence from discharges from Kennedy Wasteway, Sand Creek and Cottonwood Creek. These areas are primarily dominated by field, grain and hay crops. If contamination is detected at that location, sampling can

continue upstream to determine if the source was from the St. Johns River or from one of the contributing watersheds to the north. If the contamination was discovered to be from a source contributory to the St. Johns River, and said contaminant was absent at SP-2, the source of contamination would likely be located on the River between the two sampling points. Sources of contamination determined to be from one of the northerly tributaries would have to be identified by upstream sampling at discreet locations dividing one stream group from another.

Rationale for a sampling location upstream of SP-4 exists as this site is often devoid of water, even during irrigation runs. When insufficient entitlement exists for the lower river units to run, the St. Johns River is dry below Road 80 and, at times, is dry below Road 108. At these times, SP-2 is adequate to demonstrate if impacts exist.

4.1.5 Elk Bayou (SP-5)

During MRP development under the previous conditional waiver (R5-2008-0005) the Water Board requested that a site be added at a point on Elk Bayou. Sampling Point SP-5 was chosen at a site easterly of Highway 99. The location was chosen to reflect the agricultural activities which could contribute return flows to Bates Slough, Outside Creek and Lewis Creek, all of which combine to form Elk Bayou Slough. These waterways flow principally through pasture and field crops. The sampling point was located easterly of Highway 99 to avoid potential adverse influences from a number of sources which are not agricultural in nature. These include the Tulare Municipal Golf Course, the airport operations associated with Mefford Field and air pollution and weed control measures associated with Highway 99.

4.1.6 Goshen Ditch (SP-6)

The Water Board also requested an additional location during the previous MRP development which would reflect the impacts of agricultural return flows on diversions for agricultural purposes on users in the lower end of an agricultural water supply system. Sampling and testing of Goshen Ditch at SP-6 was selected to accomplish this objective. The last diversion for reasonable beneficial use for agricultural purposes from Goshen Ditch is at SP-6. As the last point of diversion, this location will allow for the impacts of agricultural return flows on downstream water users within the Goshen Ditch Company service area, if any, to be determined. Thus, the objectives sought by the Water Board could be accomplished with the selection of this site. The Goshen Ditch Company service area consists of pastures and field crops.

4.1.7 Cameron Creek (CC1 and CC2)

CC1 and CC2 are designed to sample the waters being conveyed in Cameron Creek near the City of Visalia. CC1 is located east of the City of Visalia and CC2 is located to the south of the City. CC1 and CC2 were chosen to test waters in Cameron Creek for potential impacts from urban or residential land uses along with agriculture. These locations are in the center of the KBWQA boundary which is primarily dominated by fruit and nut crops. The two locations will be used to compare water quality before and after contact with residential and urban uses. If a contaminant is found at CC2, but not at CC1, there is greater potential the contaminant did not come from agricultural sources. If such a case occurs, further analysis of potential discharges between the two monitoring locations will be performed.

4.1.8 Foothill Ditch (FD)

FD is designed to sample the waters being conveyed into Yokohl Creek near the foothills on the east side of the KBWQA. FD is located near an agricultural diversion spill near the Creek. FD was chosen to test agricultural drainage that could spill into Yokohl Creek. This location is near the foothills in the eastern portion of the KBWQA, northeast of Exeter. Crops in this area are primarily citrus crops. Recently, a detention basin was constructed to have more control over agriculture spill. If it is determined the new basin prevents agricultural spill water from reaching the Yokohl Creek, the KBWQA may request to remove this location as a monitoring site, as there would be no impacts to surface water.

4.1.9 Lewis Creek (LC)

LC is designed to sample the waters being conveyed into Lewis Creek near the southern boundary of the KBWQA. LC is located within an agricultural intensive area. LC was chosen to test for agricultural drainage that could find its way into Lewis Creek. Agriculture is the dominant land use in this area and dominated by field, grain and hay crops. With water supplies becoming scarcer in the region, growers have been better at catching their drainage water for potential reuse. This trend has led to better management and may reduce the amount of potential sampling events in the future.

4.1.10 Watson-Persian Ditch (WPD)

WPD is designed to sample the waters being conveyed through the City of Visalia in the Watson-Persian Ditch that originated from the Kaweah River. WPD is located near the western edge of the City of Visalia within a primarily urban or residential area. Water reaching this location is expected to be heavily influenced by uses other than agriculture. Results from this site will be compared to results taken at SP1 to determine potential impacts. Due to the Watson-Persian Ditch flowing through the City, finding the source of contaminants may be difficult due to restricted access near private lands.

4.1.11 Wutchumna Spill (WS)

WS is designed to sample the waters being conveyed through Wutchumna Ditch as it spills into Cottonwood Creek. WS is located near the northern edge of the KBWQA, near SP3. Results from this site will be compared to results taken at SP3 to determine potential impacts caused from agriculture in this region of the KBWQA.

4.2 Core Monitoring Sites

The KBWQA has currently decided to not classify any current sites as Core Monitoring sites. This is primarily due to the prioritization effort (Section 5) the KBWQA is proposing to allow for maximum constituent monitoring while also keeping costs to Members down. The KBWQA may change established sites to Core Monitoring in the future if circumstances determine this to be a necessary step. If such a change is needed, the Water Board will be informed in writing. Potential Core Monitoring sites will follow the Core Monitoring schedule and sample the monitored parameters discussed in Sections 5 and 6, respectively

4.3 Ephemeral Monitoring Sites

None of the small creek and river sub-watersheds are truly ephemeral and with many channels being used for schedulable agricultural deliveries ephemeral monitoring is not seen as necessary in the

KBWQA boundary at this time. If in the future an Ephemeral Monitoring Site is deemed fitting and necessary, the Water Board will be informed of this decision in writing. Sites classified as Ephemeral will sample Assessment Monitoring Parameters when water is present and flowing. Weather forecasts will be monitored to catch storm flows when they occur.

4.4 Special Project Sites

Special project sites are planned to be developed and implemented as needed through a management plan. The Water Board will be informed of potential sites during management plan development and implementation. The sampling schedule and monitored parameters will be designated during site development.

4.5 Rejected Monitoring Sites

The KBWQA believes there is appropriate coverage of the Watershed to analyze potential impacts from agricultural activities. None of the current sites are rejected, so as to maintain the coverage established from the previous General Order and continue the monitoring into the future to develop a good history of water quality in the KBWQA boundary. Concurrently, no new monitoring sites are proposed at this time.

4.6 Selection Rationale Summary

Monitoring sites were selected due to their coverage across the watershed and existing monitoring history. The KBWQA believes that maintaining the current monitoring sites will develop a strong history record. As the history record develops over time, trends and impacts can be more fully determined. New monitoring sites may be developed in the future depending on results and trends from the current monitoring strategy, or if required by a Management Plan to address exceedances of a water quality parameter. Potential new sites are expected to be developed as special project sites during management plans and are expected to be primarily used for determining source of the exceedance.

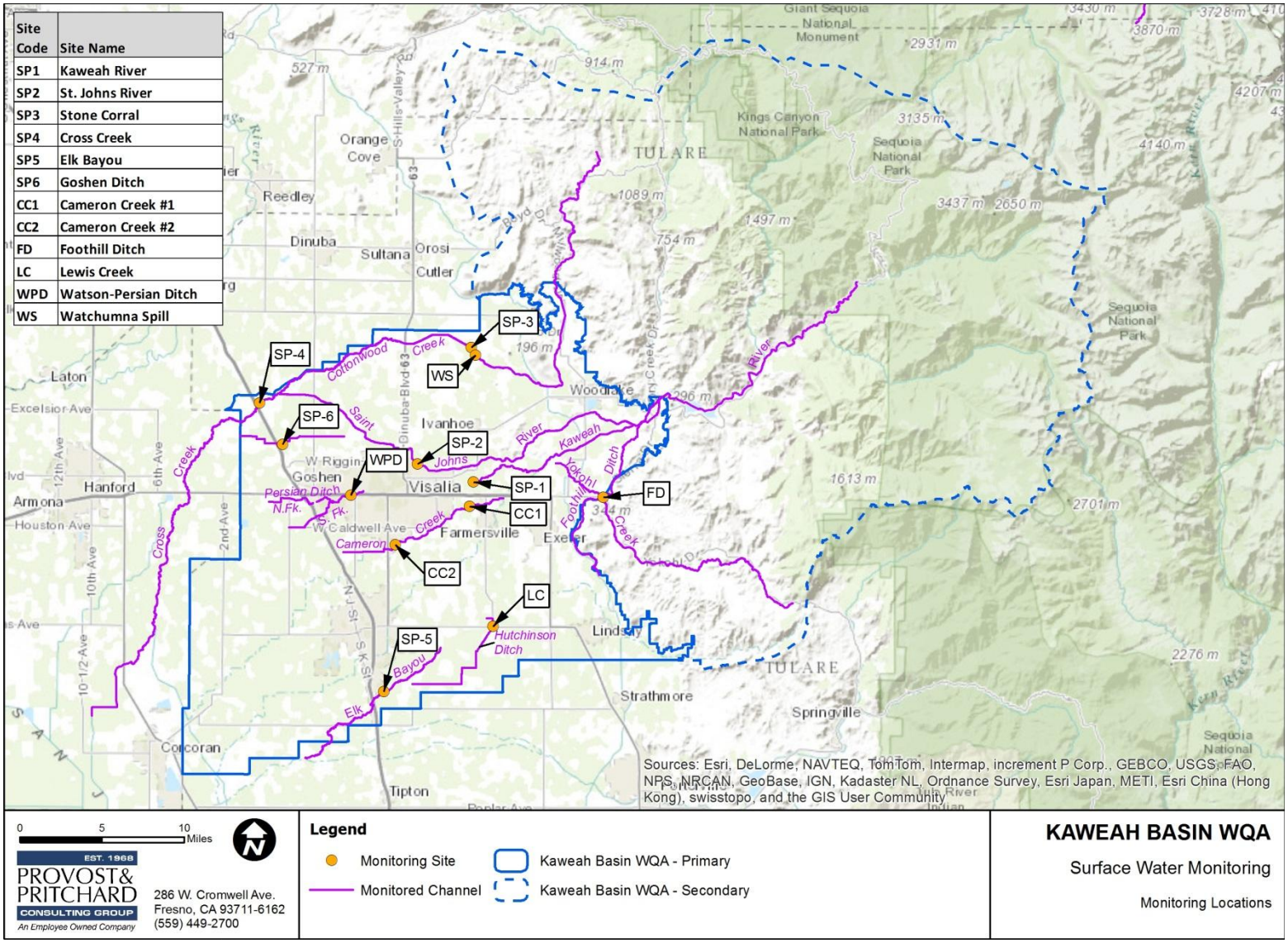

Figure 4-1: Map of Kaweah Monitoring Sites

5 SURFACE WATER MONITORING SCHEDULE

Monitoring schedules and frequency will conform to the guidelines set forth by the Water Board in Attachment B of the General Order. The KBWQA plans monitoring all sampling sites for Assessment Monitoring parameters through a rotating prioritization schedule. However, unlike monitoring under Conditional Waiver R5-2008-2005 that had a set monitoring times each month, the KBWQA will monitor weather and irrigation schedules to capture an event throughout the month. Only one sample will be taken per month to keep costs down. This effort will also satisfy the requirement to capture at least two storm runoff events, if such events occur.

5.1 Assessment Monitoring Schedule

The Assessment Monitoring Schedule will commence upon approval of this SWMP by the Executive Officer, which is expected for September 2014. The KBWQA proposes to follow a new prioritized schedule that rotates through the 12 Assessment Monitoring sites. This schedule is discussed in more detail at the end of this section, but in summary it is a rotating four year cycle that analyzes three sites per year for all Assessment Parameters. The KBWQA is electing to follow a water year as its annual monitoring period, Year 1 will begin when the SWMP is approved (expected for September 2014 and run through September 2015. Assessment Monitoring parameters will be sampled monthly, when water is present, for general water quality, pathogens, nutrients, metals, pesticides, and water and sediment toxicity. Assessment Monitoring parameters and frequency are summarized in **Table 5-1**. More parameter specific information is provided in Section 6: Monitored Parameters.

5.2 Core Monitoring Schedule

The Core Monitoring Schedule will be utilized if it is deemed necessary to reclassify an existing monitoring site. If such a situation is to occur, the Water Board will be notified in writing prior to any change in action. Per Order requirements, Core Monitoring will operate on a repeating three year cycle beginning with Assessment parameters in Year 1 and Core parameters in Years 2 and 3. Core Monitoring will also follow the water year for the annual monitoring period. If needed, the KBWQA expects to coordinate Core Monitoring with the water year, so as to not have partial years. The Core Monitoring Schedule Cycle is summarized in **Table 5-2**.

Core Monitoring Parameters will consist of monthly sampling, when water is present and flowing, for general water quality, pathogens, nutrients, water toxicity, and possible parameters of concern identified by the Water Board. The monitoring parameters and frequency are summarized in **Table 5-3**. Assessment Monitoring includes metal, pesticide and sediment toxicity parameters in addition to Core parameters.

5.3 Ephemeral and Special Project Monitoring Schedule

Currently, none of the small creek and river sub-watersheds are believed to be truly ephemeral with many channels being used for schedulable agricultural deliveries. For this reason the Ephemeral Monitoring is unnecessary at this time. However, if future circumstances dictate the need for an Ephemeral Monitoring Site, the Water Board will be informed of this decision in writing. Sites classified as Ephemeral will be included into the monitoring rotation and be monitored to catch flows as they occur, but not more than one sample in a month. Weather forecasts will be monitored, especially during the storm season, to catch flows.

Special Project monitoring sites are expected to be utilized as part of a Surface Water Quality Management Plan. These sites will allow the KBWQA to track down the sources causing the exceedances that led to a SQMP being required. The KBWQA only intends to use Special Project sites while a SQMP is in effect. The monitoring schedule is expected to be determined based on needs of a SQMP.

As stated previously, the KBWQA feels there is appropriate coverage across the third-party area with the established monitoring sites. In addition, the adding of sampling locations significantly increases costs to the KBWQA Members. Therefore, if additional sites are necessary (i.e. triggered by a SQMP), the KBWQA intends to develop a plan that will work effectively to analyze for potential pollutants, stop the potential source(s) from polluting surface water (if found), and complete any related work to reduce the financial burden.

5.4 Prioritization

The KBWQA proposes to follow a prioritized schedule of the Assessment Monitoring sites. The schedule, shown in **Figure 5-1**, is a repeating four year schedule that rotates through the 12 monitoring sites. The sites with past higher priority exceedance issues (SP3, FD) are placed earlier in the rotation to analyze all parameters early. Sites with no or low priority exceedances (CC1/CC2, WS) are later in the rotation, as management practices in those areas appear to be more protective of surface water quality. This prioritization allows for all parameters to be monitored with every sampling event, while also keeping the financial burden reasonable for the KBWQA members.

The KBWQA understands this prioritization is the starting point for the new surface water monitoring program and the schedule will adapt as necessary. Updates to existing SQMPs, or new SQMPs (if triggered), is expected to alter the schedule in that "off" years for a site may need to include monitoring for specific parameters. Also, if new sites are added, then the repeating schedule may increase from four years or existing sites may be dropped from the rotation.

SECTION FIVE

Figure 5-1: Proposed KBWQA Prioritization (First 3 Cycles)

Monitoring Site	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
SP1	■				■				■			
SP2		■				■				■		
SP3	■				■				■			
SP4			■				■				■	
SP5			■				■				■	
SP6		■				■				■		
CC1				■				■				■
CC2				■				■				■
FD	■				■				■			
LC		■				■				■		
WPD				■				■				■
WS			■				■				■	

Table 5-1: Assessment Monitoring Schedule and Parameters

Parameters	Monitoring Frequency[1]
Photo monitoring (digital)	Every monitoring event (wet or dry)
General Physical Parameters	Monthly
Nutrients	Monthly
Pathogens	Monthly
Water Column Toxicity	Monthly
Metals	Monthly
Pesticides	Monthly
Sediment Toxicity	Twice per year[2]

(1) Will occur in Year 1 and then every three years thereafter.

(2) If water is present, one sample shall be collected between March 1 and April 30; the other sample shall be collected between August 15 and October 15.

Table 5-2: Core Monitoring Cycle

Monitoring Type	Year 1	Year 2	Year 3
Assessment	X		
Core		X[1]	X

(1) Core will include Assessment parameters exceeding trigger limits in Year 1.

Table 5-3: Core Monitoring Schedule and Parameters

Parameters	Monitoring Frequency
Photo monitoring (digital)	Every monitoring event (wet or dry)
General Physical Parameters	Monthly
Nutrients	Monthly
Pathogens	Monthly
Water Column Toxicity	Monthly
Assessment Monitoring	Once every three years
Parameter(s) of Concern[1]	Monthly

(1) Parameter(s) of Concern may be selected by the Executive Officer from Assessment analyses that result in an exceedance or degradation.

6 MONITORED PARAMETERS

Surface water monitoring comes with a whole suite of parameters that need to be monitored to characterize the state of water quality of a watershed or represented watershed. The primary focus of the monitored parameters is to determine the impact irrigated agriculture is having on surface waters, if an impact is identified. The selection and type of monitored parameters are further discussed in this section. Samples will only be taken when water is flowing at the monitoring locations. The methods by which each parameter is analyzed will be discussed in the Quality Assurance Project Plan (**QAPP**) section.

6.1 Field Measurements

Field measurements are measurements taken in the field during sampling. These are quick measurements taken in the field at a sampling location to classify the surface water as it is in the field. Field measurements will be taken for all monitoring site types when water is flowing. When water is not flowing, only the photo documentation of the site is necessary.

6.2 General Physical, Pathogen, and Nutrients

General physical, pathogen and nutrient parameters further classify the state of the surface water in the field; however, these parameters are analyzed in a laboratory. These parameters begin to start determining the quality of the water as different forms of Nitrogen, dissolved and suspended solids, and coliforms in the water are determined. These parameters, shown in **Table 6-1**, will be sampled for all monitoring site types.

6.3 Metals

The Water Board has specified a list of metals to be evaluated for monitoring at sites in each sub-watershed. The Third-party member is to evaluate several factors that could lead to including or excluding a metal, such as use, geological conditions, or prior monitoring data. The KBWQA, in an effort to maintain cost-effectiveness, chooses to currently monitor for all metals listed from the Water Board. Laboratories can analyze for the whole spectrum of metals at very small incremental increases per metal. It is expected that the effort taken to evaluate the different factors to exclude a metal would be significantly more costly than the incremental change in metal monitoring costs. The full list of metals to be monitored is summarized in **Table 6-1**. Metals are monitored during Assessment Monitoring events.

Although the KBWQA is choosing to initially proceed with monitoring all metals and metal fractions, it proposes to re-evaluate metal monitoring in the future. The KBWQA proposes to re-evaluate the monitoring data in three (3) years and use data to determine if some metals do not warrant monitoring at any of the testing locations. The KBWQA will review the data and propose to the Executive Officer a list of metal(s) to remove from monitoring if the following criteria are met: (1) No exceedances occurred for the metal over the three (3) year monitoring period and (2) The metal did not the cause increased toxicity in the water or sediment. If approved, the KBWQA thinks this method will be the most cost-effective process and is a compromise between the desires of the Water Board and growers in the KBWQA boundaries.

6.4 Pesticides

Pesticide parameters are not listed in Attachment B of the Order. The Order states the Executive Officer will provide the list of pesticides requiring monitoring after coordinating with qualified scientists and the Department of Pesticide Regulation. At the time of this report, a Pesticide Evaluation Advisory Workgroup is still developing a list of pesticides and evaluation criteria. Until further notice and guidance from this Workgroup, the KBWQA intends to continue monitoring for the pesticides that were in the MRP under the Conditional Waiver R5-2008-0005. Once the pesticide list and evaluation criteria are developed, the KBWQA will amend the list as necessary. The planned monitored pesticides are listed in **Table 6-1**. Pesticides will be monitored for during Assessment monitoring.

6.5 303(d) Listed Constituents

The Order states that constituents listed on the 303(d) list must be included in the monitored parameters if irrigated agriculture is identified as the source. Upon reviewing the most recent 303(d) list (2010) several water bodies within the KBWQA boundary were listed. **Table 6-2** shows the 303(d) listed water bodies with the pollutants and their sources (if known). Constituents potentially caused by agriculture are Chlorpyrifos and Dimethoate. These two constituents are already included to be monitored during each Assessment Monitoring event.

6.6 Toxicity

Toxicity sampling of the water column and sediment, as stated in the Order, is used for three primary purposes: 1) to evaluate compliance with the Basin Plan, 2) to identify causes of toxicity, and 3) to evaluate the potential cumulative toxic effect if multiple parameters are present. Survival rate or growth of the organisms in samples will be the main indicator for whether the water or sediment is toxic. The KBWQA will continue to following toxicity sampling protocols as part of the effort to determine impacts of agriculture on surface water quality.

6.6.1 Water Toxicity

Testing of toxicity in the water column will occur for all monitoring events and will analyze *Ceriodaphnia dubia* (water flea), *Pimephales promelas* (fathead minnow), and *Selenastrum capricornutum* (green algae). Survival rate for the water flea and fathead minnow will be analyzed, and growth will be analyzed for the algae. The triggers for further analysis, known as a Phase I Toxicity Identification Evaluation (TIE), are: 1) either the water flea or fathead minnow see a 50% or greater difference in mortality when comparing the ambient sample to the control, or 2) if there is a 50% or greater reduction in growth for the algae when comparing the ambient sample to the control.

The TIE will be conducted within in 48 hours of a detection of reduced survival or growth. The purpose of this evaluation is to determine potential classes of parameters that may have caused the toxicity. General parameter classification and other monitoring results should allow for the KBWQA to determine the source of the toxicity.

6.6.2 Sediment Toxicity

Sediment toxicity sampling is required at all specified monitoring locations if the appropriate sediment is present. If appropriate sediment is not present at the monitoring site, then an alternative site with the appropriate sediment must be designated for the sediment sampling. Appropriate sediments are small

soil types such as clay and silt. Since all monitoring locations are in the Kaweah River fan area, all water quality monitoring locations have the appropriate sediment and no alternative locations are necessary.

Sampling for sediment toxicity occurs only two times each year for Assessment Monitoring, unlike the water column toxicity that occurs with every sample. One sample will be collected between August 15 and October 15 and the other sample will be collected between March 1 and April 30 each year as specified in the Order.

Sediment analysis will utilize *Hyalella azteca* and follow EPA Method 600/R-99/064. Similar to water toxicity analysis of the water flea and flathead minnow, *Hyalella azteca* is analyzed for organism survival. If there is less than 80% organism survival compared to the control, further parameters need to be tested for in the sediment sample. The additional parameters are listed in **Table 6-1**. Performing a TIE is an optional tool that can be used for increased organism mortality. The KBWQA will only perform a TIE on sediment samples if the additional sediment analysis does not detect any of the tested parameters.

Table 6-1: Monitored Parameters

Constituent	Matrix	units
Field Measurements		
Flow	Fresh Water	cfs
pH	Fresh Water	
Electrical Conductivity (EC)	Fresh Water	µmhos/cm
Dissolve Oxygen (DO)	Fresh Water	mg/L
Temperature	Fresh Water	°C
Physical Parameters		
Turbidity	Fresh Water	NTU
Total Dissolved Solids (TDS)	Fresh Water	mg/L
Total Suspended Solids (TSS)	Fresh Water	mg/L
Hardness (as $CaCO_3$)	Fresh Water	mg/L
Total Organic Carbon (TOC)	Fresh Water	mg/L
Pathogens		
E. Coli	Fresh Water	MPN/100 mL
Fecal Coliform	Fresh Water	MPN/100 mL
Nutrients		
Total Kjeldahl Nitrogen (TKN)	Fresh Water	mg/L
Nitrate-N	Fresh Water	mg/L
Nitrite-N	Fresh Water	mg/L
Ammonia	Fresh Water	mg/L
Unionized Ammonia (calculated value)	Fresh Water	mg/L
Orthophosphate	Fresh Water	mg/L
Phosphorus	Fresh Water	mg/L
Metals		
Arsenic (Total)	Fresh Water	µg/L
Boron (Total)	Fresh Water	µg/L
Cadmium (Total and Dissolved)	Fresh Water	µg/L
Copper (Total and Dissolved)	Fresh Water	µg/L
Lead (Total and Dissolved)	Fresh Water	µg/L
Molybdenum (Total)	Fresh Water	µg/L
Nickel (Total and Dissolved)	Fresh Water	µg/L
Selenium (Total)	Fresh Water	µg/L
Zinc (Total and Dissolved)	Fresh Water	µg/L

Carbamates		
Aldicarb	Fresh Water	µg/L
Carbaryl	Fresh Water	µg/L
Carbofuran	Fresh Water	µg/L
Methiocarb	Fresh Water	µg/L
Methomyl	Fresh Water	µg/L
Thiobencarb	Fresh Water	µg/L
Oxamyl	Fresh Water	µg/L
Organochlorines		
DDD	Fresh Water	µg/L
DDE	Fresh Water	µg/L
DDT	Fresh Water	µg/L
Dicofol	Fresh Water	µg/L
Dieldrin	Fresh Water	µg/L
Endrin	Fresh Water	µg/L
Methoxychlor	Fresh Water	µg/L
Toxaphene	Fresh Water	µg/L
Organophosphates		
Azinphos-methyl	Fresh Water	µg/L
Chlorpyrifos	Fresh Water	µg/L
Demeton-S	Fresh Water	µg/L
Diazinon	Fresh Water	µg/L
Dichlorvos	Fresh Water	µg/L
Dimethoate	Fresh Water	µg/L
Disulfoton	Fresh Water	µg/L
Malathion	Fresh Water	µg/L
Methamidophos	Fresh Water	µg/L
Methidathion	Fresh Water	µg/L
methyl Parathion	Fresh Water	µg/L
Phorate	Fresh Water	µg/L
Phosmet	Fresh Water	µg/L
Herbicides		
Atrazine	Fresh Water	µg/L
Simazine	Fresh Water	µg/L
Cyanazine	Fresh Water	µg/L
Diuron	Fresh Water	µg/L
Molinate	Fresh Water	µg/L
Glyphosate	Fresh Water	µg/L
Paraquat	Fresh Water	µg/L
Linuron	Fresh Water	µg/L
Trifluralin	Fresh Water	µg/L

Water Column Toxicity		
Ceriodaphnia dubia (water flea)	Fresh Water	48h % survival
Pimephales promelas (fathead minnow)	Fresh Water	48h % survival
Selenastrum capricomutum (green algae)	Fresh Water	96h % survival
Sediment Toxicity		
Hyalella azteca	Sediment	10d % survival
Pesticides and & Sediment Parameters (Pyrethroids)		
Bifentrhin	Sediment	µg/kg
Chlorpyrifos	Sediment	µg/kg
Cyfluthrin	Sediment	µg/kg
Cypermethrin	Sediment	µg/kg
Deltamethrin	Sediment	µg/kg
Esfenvalerate/Fenvalerate	Sediment	µg/kg
Fenpropathrin	Sediment	µg/kg
Lamda Cyhalothrin	Sediment	µg/kg
Permethrin	Sediment	µg/kg
Piperonyl butoxide (PBO)	Sediment	µg/kg
Total Organic Carbon (TOC)	Sediment	mg/kg
Grain size	Sediment	%

Table 6-2: 2010 303(d) Listed Water Bodies in the KBWQA

Water Body	Pollutant	Potential Source
Bates Slough	Unknown Toxicity	Source Unknown
Cross Creek	Unknown Toxicity	Source Unknown
Elbow Creek	Chlorpyrifos	Agriculture
Elk Bayou	Chlorpyrifos	Agriculture
	Dimethoate	Agriculture
	pH (high)	Source Unknown
	Unknown Toxicity	Source Unknown
Kaweah Lake	Mercury	Resource Extraction
Kaweah River (below Terminus Dam)	pH	Source Unknown
	Unknown Toxicity	Source Unknown
Lower Kaweah River	Unknown Toxicity	Source Unknown
Mill Creek	Unknown Toxicity	Source Unknown
Outside Creek	Unknown Toxicity	Source Unknown
Packwood Creek	Unknown Toxicity	Source Unknown

7 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The Quality Assurance Project Plan governs the sampling and testing performed under this SWMP. Collection and analysis protocols will be established for each constituent and method. Fruit Growers Laboratory, Inc. (**FGL**) will be performing the sampling for the KBWQA and will follow the protocols set forth in the approved QAPP during each sampling event. A brief summary for the different components to sampling are set forth below. The full QAPP is submitted along with this SWMP in **Appendix B** as required by the Order.

7.1 Sample Collection

Sample collection includes several components to be compliant with the MRP requirements of the Order. Photo documentation and field data are required at each event which occurs on a monthly basis. Ambient water and sediment sampling only occur when water is present and flowing during a monthly event. Components of sample collection are summarized below.

7.1.1 Photo Documentation and Field Data

Photo documentation of the monitoring site will be performed at all monitoring events, regardless of whether water is present and/or flowing. Photos will be combined with field sheets to describe the site at each event. Field parameters are also recorded regardless of whether water is present and/or flowing. Field data includes time on site, weather observations, water and sediment characteristic, and any additional site descriptions or comments.

7.1.2 Ambient Water

Sampling for a site generally takes several hours on one day if water is flowing. To perform the water sampling, a specified quantity and type of bottles are filled with water from the channel based on the requirements of the analysis to be performed for a given sampling site as described in Sections 5 and 6 and the QAPP. Collected samples must be stored at a temperature less than or equal to 4°C and must be delivered within 24 hours to the necessary laboratories. Holding times for different constituents will govern the order of analyses performed. All bottles for a site will be given the same sample time and date to track the different results for a site. Quality Control samples such as field duplicates and samples for matrix spike analysis will also be filled during collection and stored and transported in the same manner as the other samples. Field blanks will also be used as part of the quality control process, but these bottles will be filled with deionized water. Flow in the channel will also be measured. Further detail regarding ambient water sampling is provided in the QAPP.

7.1.3 Sediment

Sediment is collected two times per year following the schedule provided in Section 5. Samples are taken from the topmost two (2) centimeters (**cm**) of channel bed substrate and placed into the containers for toxicity testing, grain size and total organic carbon (**TOC**) analyses. Other containers will be provided for additional sediment samples in the event any chemical analyses are necessary due to increased toxicity. Sediment samples for chemistry and grain size and TOC are frozen within 48 hours while toxicity and grain size samples are held at 4°C until analysis begins. Further detail regarding sediment sampling is provided in the QAPP.

7.2 Laboratory Analysis

Analysis of samples will be handled by FGL. FGL subcontracts with Aquatic Bioassay and Consulting Laboratories, Inc. (**ABC**) for testing of water column and sediment toxicity and Agriculture Priority Pollutants, Inc. (**APPL**) for testing of some of the pesticide and herbicide monitored parameters. These labs will follow methods acceptable by the Water Board and will provide written notification if another method is to be used. The quality assurance manuals and standard operating procedures (**SOPs**) for these organizations will be part of the KBWQA QAPP, but are also available by contacting the laboratories directly. A summary of the analytical methods used and the trigger, reporting, and minimum detection limits are provided in **Table 7-1**.

7.3 Quality Control

Quality assurance and control objectives for sample collection and laboratory analysis are explicitly described in the QAPP. These objectives describe the criteria for making sure results are correct and complete. Criteria include discussion on equipment precision and accuracy, contamination either by the sampler or equipment, and completeness. Precision and accuracy are checked through various duplicate field and lab samples to confirm validity of results. Contamination is prevented through thorough cleaning of equipment and strict adherence to monitoring protocols. Completeness is gauged based on percentage of valid result data is produced. The goal is to have at least 90% of the data meet all quality criteria. Failure to meet any of the criteria will result in data to be flagged with the appropriate SWAMP/CEDEN flag. Both FGL and KBWQA staff will review data for completeness and flag data as appropriately. The Electronic Data Deliverable (**EDD**) Checklist and Online Data Checker tools provided by the Water Board will be utilized to check data submittal format and completeness. Review of the failures may result in rejection of the data.

In addition to the QAPP guiding laboratory and sampling practices, the KBWQA also proposes to follow actions that will reduce bias, variability, and uncertainty. The KBWQA will make an effort to sample the first water flow in a month where water is flowing, and each sample will be taken at the same location at a monitoring site. These two efforts should reduce bias and uncertainty for the monitoring program by creating a set time to go after a sample. This can lead to variability on whether storm or irrigation water is being sampled. This variability will be noted in the field reporting data as to when the sample was taken and what the surround lands and weather conditions were during and prior to an event.

Table 7-1: Methods and Limits for Monitored Parameters

Constituent	Matrix	Analyzing Lab	units	WQTL	RL	MDL	Analytical Method
Field Measurements							
Flow	Fresh Water	Field Measure	cfs	NA	1	NA	
pH	Fresh Water	Field Measure		<6.5; >8.3	0.1	NA	EPA 150.1
Electrical Conductivity (EC)	Fresh Water	Field Measure	µmhos/cm	700	50	NA	EPA 120.1
Dissolve Oxygen (DO)	Fresh Water	Field Measure	mg/L	5	0.1	NA	SM 4500-O
Temperature	Fresh Water	Field Measure	°C	NA	0.1	NA	SM 2550
Physical Parameters							
Turbidity	Fresh Water	FGL	NTU	NA	0.05	0.02	SM 2130B
Total Dissolved Solids (TDS)	Fresh Water	FGL	mg/L	450	10	4	SM 2540 D
Total Suspended Solids (TSS)	Fresh Water	FGL	mg/L	NA	10	NA	SM 2540 C
Hardness (as $CaCO_3$)	Fresh Water	FGL	mg/L	NA	2.5	1	EPA 200.7
Total Organic Carbon (TOC)	Fresh Water	FGL	mg/L	NA	0.5	0.13	SM 5310 C
Pathogens							
E. Coli	Fresh Water	FGL	MPN/100 mL	235	1	1	SM 9223 B
Fecal Coliform	Fresh Water	FGL	MPN/100 mL	400	1	1	SM 9221 E
Nutrients							
Total Kjeldahl Nitrogen (TKN)	Fresh Water	FGL	mg/L	NA	0.5	0.27	EPA 351.2
Nitrate-N	Fresh Water	FGL	mg/L	10	0.1	0.01	EPA 300.0
Nitrite-N	Fresh Water	FGL	mg/L	10	0.1	0.01	EPA 300.0
Ammonia	Fresh Water	FGL	mg/L	1.5	0.1	0.05	SM 4500-NH3 G
Unionized Ammonia (calculated value)	Fresh Water	FGL	mg/L	1.5	0.1	0.05	SM 4500-NH3 G
Orthophosphate	Fresh Water	FGL	mg/L	NA	0.1	0.01	SM 4500 P E
Phosphorus	Fresh Water	FGL	mg/L	NA	0.1	0.01	SM 4500 P E

Metals							
Arsenic (Total)	Fresh Water	FGL	µg/L	10	1	0.09	EPA 200.8
Boron (Total)	Fresh Water	FGL	µg/L	700	50	5	EPA 200.8
Cadmium (Total and Dissolved)	Fresh Water	FGL	µg/L	5	0.1	0.02	EPA 200.8
Copper (Total and Dissolved)	Fresh Water	FGL	µg/L	Variable	1	0.1	EPA 200.8
Lead (Total and Dissolved)	Fresh Water	FGL	µg/L	Variable	0.2	0.1	EPA 200.8
Molybdenum (Total)	Fresh Water	FGL	µg/L	10	1	0.05	EPA 200.8
Nickel (Total and Dissolved)	Fresh Water	FGL	µg/L	100	1	0.2	EPA 200.8
Selenium (Total)	Fresh Water	FGL	µg/L	5	1	0.1	EPA 200.8
Zinc (Total and Dissolved)	Fresh Water	FGL	µg/L	Variable	1	0.1	EPA 200.8
Carbamates							
Aldicarb	Fresh Water	APPL	µg/L	3	0.40	0.20	EPA 8321A
Carbaryl	Fresh Water	APPL	µg/L	2.53	0.07	0.05	EPA 8321A
Carbofuran	Fresh Water	APPL	µg/L	0.5	0.07	0.05	EPA 8321A
Methiocarb	Fresh Water	APPL	µg/L	5	0.40	0.20	EPA 8321A
Methomyl	Fresh Water	APPL	µg/L	0.52	0.07	0.05	EPA 8321A
Thiobencarb	Fresh Water	APPL	µg/L	3.1	0.50	0.06	EPA 8321A
Oxamyl	Fresh Water	APPL	µg/L	50	0.40	0.20	EPA 8321A
Organochlorines							
DDD	Fresh Water	FGL	µg/L	0.00083	0.01	0.003	EPA 625 (Pest.)
DDE	Fresh Water	FGL	µg/L	0.00059	0.01	0.004	EPA 625 (Pest.)
DDT	Fresh Water	FGL	µg/L	0.00059	0.01	0.007	EPA 625 (Pest.)
Dicofol	Fresh Water	FGL	µg/L	NA	0.1	0.01	EPA 608
Dieldrin	Fresh Water	FGL	µg/L	0.056	0.01	0.005	EPA 625 (Pest.)
Endrin	Fresh Water	FGL	µg/L	0.76	0.01	0.007	EPA 625 (Pest.)
Methoxychlor	Fresh Water	FGL	µg/L	0.03	0.01	0.008	EPA 625 (Pest.)
Toxaphene	Fresh Water	FGL	µg/L				EPA 608

Organophosphates							
Azinphos-methyl	Fresh Water	APPL	µg/L	0.01	0.1	0.02	EPA 625 (Pest.)
Chlorpyrifos	Fresh Water	APPL	µg/L	0.015	0.02	0.003	EPA 625 (Pest.)
Demeton-S	Fresh Water	APPL	µg/L	NA	0.1	0.01	EPA 625 (Pest.)
Diazinon	Fresh Water	APPL	µg/L	0.1	0.02	0.004	EPA 625 (Pest.)
Dichlorvos	Fresh Water	APPL	µg/L	0.085	0.1	0.02	EPA 625 (Pest.)
Dimethoate	Fresh Water	APPL	µg/L	1	0.1	0.08	EPA 625 (Pest.)
Disulfoton	Fresh Water	APPL	µg/L	0.05	0.1	0.02	EPA 625 (Pest.)
Malathion	Fresh Water	APPL	µg/L	0.1	0.1	0.05	EPA 625 (Pest.)
Methamidophos	Fresh Water	APPL	µg/L	0.35	0.2	0.01	EPA 8321 AM
Methidathion	Fresh Water	APPL	µg/L	0.7	0.1	0.04	EPA 625 (Pest.)
methyl Parathion	Fresh Water	APPL	µg/L	0.08	0.1	0.075	EPA 625 (Pest.)
Phorate	Fresh Water	APPL	µg/L	0.7	0.1	0.072	EPA 625 (Pest.)
Phosmet	Fresh Water	APPL	µg/L	140	0.2	0.06	EPA 625 (Pest.)
Herbicides							
Atrazine	Fresh Water	FGL	µg/L	1	0.5	0.07	EPA 507
Simazine	Fresh Water	FGL	µg/L	4	0.5	0.08	EPA 507
Cyanazine	Fresh Water	FGL	µg/L	1	0.5	0.09	EPA 507
Diuron	Fresh Water	APPL	µg/L	2	0.4	0.2	EPA 8321A
Glyphosate	Fresh Water	FGL	µg/L	700	5	4	EPA 547
Paraquat	Fresh Water	FGL	µg/L	3.2	0.4	0.2	EPA 549.2
Linuron	Fresh Water	APPL	µg/L	1.4	0.4	0.2	EPA 8321A
Trifluralin	Fresh Water	FGL	µg/L	5	0.05	0.03	EPA 625 (Pest.)
Water Column Toxicity							
Ceriodaphnia dubia (water flea)	Fresh Water	ABC	48h % survival	50%	NA	NA	EPA 821-RO2-012
Pimephales promelas (fathead minnow)	Fresh Water	ABC	48h % survival	50%	NA	NA	EPA 821-RO2-012
Selenastrum capricomutum (green algae)	Fresh Water	ABC	96h % survival	50%	NA	NA	EPA 821-RO2-013

Sediment Toxicity							
Hyalella azteca	Sediment	ABC	10d % survival	80%	NA	NA	EPA 600-R99-064
Pesticides and & Sediemt Parameters (Pyrethroids)							
Bifentrhin	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8081
Chlorpyrifos	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8241
Cyfluthrin	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8081
Cypermethrin	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8081
Deltamethrin	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8081
Esfenvalerate/Fenvalerate	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8081
Fenpropathrin	Sediment	ABC	µg/kg	NA	0.3	0.05	EPA 8081
Lamda Cyhalothrin	Sediment	ABC	µg/kg	NA	0.3	0.05	EPA 8081
Permethrin	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8081
Piperonyl butoxide (PBO)	Sediment	ABC	µg/kg	NA	0.3	0.1	EPA 8081
Total Organic Carbon (TOC)	Sediment	ABC	mg/kg	NA	200	100	EPA 9060
Grain size	Sediment	ABC	%	NA	NA	NA	SM 2560 D

8 REPORTING

Pursuant to Monitoring and Reporting Program under this Order, the KBWQA must submit its Surface Water Monitoring Plan to the Executive Officer within 180 days of the Notice of Applicability to be a Third-party member. The KBWQA received its NOA on February 7, 2014, making the submittal date for the Plan to be August 6, 2014. Any revisions to this Plan, if necessary, will be submitted according to a schedule determined by the Executive Officer.

In addition to development of a Surface Water Monitoring Plan, Quarterly and Annual Monitoring Reports, Exceedance Reports, and potentially Surface Water Quality Management Plans are to be reported by the KBWQA. This requirement is similar to the previous MRP under conditional waiver R5-2008-0005.

8.1 Quarterly Reporting

The purpose of the quarterly reporting is to supply surface water monitoring data to the Water Board for the previous quarter's results. **Table 8-1** summarizes the due dates for the reporting period. The items to be included with the data for the quarterly reporting are listed on page 23 of Attachment B of the Order.

Table 8-1: Quarterly Surface Water Reporting Schedule

Reporting Period	Due Date
October 1st through December 31st of previous calendar year	March 1st
January 1st through March 31st of same calendar year	June 1st
April 1st through June 30th of same calendar year	September 1st
July 1st through September 30th of same calendar year	December 1st

8.2 Annual Reporting

Annual monitoring reports summarize the previous year's data and KBWQA efforts to inform, implement, and review practices that are to benefit water quality in the group boundaries. These reports are quite extensive and include several required components, listed below. Minor changes have been made to the reporting period and due date from the previous MRP under conditional waiver R5-2008-0005. Under the newly adopted Order the Monitoring and Reporting Program states the reporting period will be a hydrologic water year (October 1 through September 30) instead of a calendar year. Annual reports will be submitted May 1st every year, per Order requirement.

1. Signed Transmittal Letter;
2. Title page;
3. Table of contents;
4. Executive Summary;
5. Description of the Coalition Group geographical area;
6. Monitoring objectives and design;

7. Sampling site descriptions and rainfall records for the time period covered under the Monitoring Report;
8. Location map(s) of sampling sites, crops and land uses;
9. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
10. Discussion of data relative to water quality objectives, and water quality management plan milestones/Basin Plan Amendment Workplan updates, where applicable;
11. Sampling and analytical methods used;
12. Associated laboratory and field quality control sample results;
13. Summary of Quality Assurance Evaluation results (as identified in the most recent version of the third-party's approved QAPP for Precision, Accuracy, and Completeness);
14. Specification of the method(s) used to obtain estimated flow at each surface water monitoring site during each monitoring event;
15. Summary of exceedances of water quality objectives/trigger limits occurring during the reporting period and for surface water related pesticide use information;
16. Actions taken to address water quality exceedances that have occurred, including but not limited to, revised or additional management practices implemented;
17. Evaluation of monitoring data to identify spatial trends and patterns;
18. Summary of Nitrogen Management Plan information submitted to the third-party;
19. Summary of management practice information collected as part of Farm Evaluations;
20. Summary of mitigation monitoring;
21. Summary of Education and outreach activities; and
22. Conclusions and recommendations.

8.3 Exceedance Reporting

Exceedance reporting is required when monitoring results show an exceedance of adopted numeric water quality objectives or trigger limits for a monitored parameter. Exceedances must be determined within five (5) business days of receiving laboratory reports. Exceedance reports are to be emailed to a designated Water Board staff contact the next business day after determining an exceedance. The KBWQA designated contact is Brent Vandenburgh, and his email is bvandenburgh@waterboards.ca.gov.

8.4 Surface Water Quality Management Plans (SQMPs)

The purpose of monitoring surface water quality is to assess whether waters of the State within the KBWQA boundary are being improved or degraded as a result of farming operations and then make an effort to prevent further degradation. The degradation prevention effort is to be achieved through Surface Water Quality Management Plans, which are triggered if during a three (3) year period more than one exceedance of the same parameter occurs at the same monitoring location. If this occurs, a schedule for SQMP development and implementation will be provided by the KBWQA to Water Board staff within 10 business days. The KBWQA will work with Water Board Staff to develop an approved SQMP in a reasonable timeframe. For a SQMP to be approved several components to be included are: physical setting, plan strategy, monitoring methods, and data evaluation methodology. Each component is discussed further in Appendix MRP-1 of Attachment B of the Order. Approved SQMPs will be updated on an annual basis on May 1 of each year the plan is in effect. The annual report will review

all data collected, landowner outreach, management practice implementation, and any other actions taken during the previous year will be reported and reviewed.

In June 2013, the Kaweah River Sub-Watershed, through the Kaweah & St. Johns River Association, submitted a Management Plan Program to the Water Board for approval. The purpose of this report was to set a protocol and guidelines for developing and implementing management plans when they were triggered. This report has been included in **Appendix C**. The KBWQA plans to utilize this plan as a basis for developing SQMPs going forward. The KBWQA understands that management plans were triggered under the previous Conditional Waiver for a number of sites managed by the KSJRA. The KBWQA proposes to work with the Water Board to finalize, approve, and implement the SQMPs still necessary. Precedence will be given to SQMPs with higher priority issues.

In cases where the KBWQA believes exceedances are not likely to be the result of agricultural operations and/or remedied or addressed by a SQMP, the KBWQA will submit to the Executive Officer a request of exemption from development of a SQMP. It is also understood that the Executive Officer may also request the KBWQA to submit additional SQMPs and/or monitoring within an existing SQMP.

9 KBWQA CONTACT INFORMATION

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10 BIBLIOGRAPHY/REFERENCES

Below is list of the major references reviewed during development of this KBWQA Surface Water Monitoring Plan. A complete list of references can be made available upon request.

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APPENDICES

APPENDIX A

Tulare County Agricultural Commissioner

2013 Annual Crop Report

APPENDIX B

Quality Assurance Project Plan (QAPP)

(See QAPP Report and CD for hardcopy and electronic copy)

APPENDIX C

Kaweah & St. John's River Association

Management Plan Program

2013 TULARE COUNTY ANNUAL CROP AND LIVESTOCK REPORT

In Partnership With You!

Begin Exploring Tulare County Opportunities

- Leads the nation in agricultural production
  $7.8 billion - 2013 total crop value
- The top dairy production in the nation
  $2.1 billion - 2013 milk production
- Streamlined & Simplified permitting
- Central location between three major ports:
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  *Port of Stockton - 2.6 hour drive time.
- Easy highway & railroad accessibility
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Tulare County Agricultural Commissioner/Sealer

Marilyn Kinoshita, Agricultural Commissioner
Sealer of Weights and Measures
Tom Tucker, Assistant
Commissioner/Sealer

Karen Ross, Secretary
California Department of Food and Agriculture

July 2014

and

The Honorable Board of Supervisors
County of Tulare

Phillip Cox, Chairman
Steve Worthley — Pete Vander Poel
Mike Ennis — Allen Ishida

Jean Rousseau – County Administrative Officer

It is my pleasure to submit the 2013 Tulare County Annual Crop and Livestock Report. The report is produced in accordance with Sections 2272 and 2279 of the California Food and Agricultural Code, and summarizes the acreage, production, and value of Tulare County's agricultural commodities. The figures contained herein represent gross returns to the producer, and do not reflect actual net profit.

Tulare County's total gross production value for 2013 is **$7,809,626,000**. This represents an increase of $1,598,933,000, or 25.7% above 2012's value of $6,210,693,000.

Milk continues to be the leading agricultural commodity in Tulare County; with a total gross value of $2,083,354,000, an increase of $269,538,000 or 14.9%. Milk represents 26.7% of the total crop and livestock value for 2013. Total milk production in Tulare County remained relatively stable. Livestock and Poultry's gross value of $765,047,000 represents an increase of 15.8% above 2012, mostly due to higher per unit value for all species.

Fruit and Nut commodities were valued at $4,053,422,000, representing an increase of 43.0%. The majority of this gain was a result of higher prices for nuts and kiwifruit. The total value of all Field Crops was $715,735,000, a decrease of 6.5% from the previous year. It seems the decrease is due to a shift toward Small Grain Silage Crops, that have a lower per unit value than other field crops. Nursery Products were valued at $71,451,000 representing an increase of 6.1% from 2012. This increase is a reflection of the slight rebound of the housing market, as the majority of the change came from Ornamental Trees and Shrubs. Vegetable Crops were valued at $25,758,000 in 2013, representing a 30.8% increase. Harvested vegetable acreage also increased by 397 acres.

Tulare County's agricultural strength is based on the diversity of the crops produced. The 2013 report covers more than 120 different commodities, forty-five of which have a gross value in excess of $1,000,000. Although individual commodities may experience difficulties from year to year, Tulare County continues to produce high-quality crops that provide food and fiber to more than 83 countries throughout the world.

I wish to express my sincere appreciation to the many producers, processors, and agencies, both private and public, who supported our efforts in producing this report. I would also like to thank all the members of my staff, particularly Lea Pereira, Jacqui Balderas, and Dennis Haines. Without their hard work and valuable input, the publication of this report would not have been possible.

Respectfully submitted,

Marilyn Kinoshita
Agricultural Commissioner/Sealer

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Gabriel Chan	Tesfaye Jimma	Lea Pereira	Jason Taylor	

Extra Help Inspector Aides & Pest Detection Trappers

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Manuel Avina-Rojas	Katrina Jones	Cari O'Dell	Robert Smith
Charles Batchelor	Steven Kampen	Eusebio Perez, Jr.	Deo Tigulo
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PERMANENT PLANTING ACREAGE

	Bearing Acreage	Non-Bearing Acreage	Total Acreage
CITRUS			
Grapefruit & Pomelos	2,180	112	2,292
Lemons	6,930	421	7,351
Navels	76,700	1,130	77,830
Valencias	16,600	49	16,649
Tangerines & Tangelos[a]	13,800	395	14,195
Other Citrus [b]	100	59	159
Total Citrus	116,310	2,166	118,476
DECIDUOUS & GRAPES			
Almonds	38,100	1,880	39,980
Apples	72	0	72
Apricots	767	1	768
Avocados	230	0	230
Blueberries	1,330	1,100	2,430
Cherries	2,520	754	3,274
Grapes			
Raisin	16,600	27	16,627
Table	34,700	1,710	36,410
Wine	10,900	591	11,491
Kiwifruit	2,450	9	2,459
Nectarines	11,400	231	11,631
Olives	12,300	226	12,526
Peaches			
Cling	1,310	7	1,317
Freestone	12,200	148	12,348
Pears & Asian Pears	199	0	199
Pecans	856	316	1,172
Persimmons	2,430	239	2,669
Pistachios	41,300	4,080	45,380
Plums & Pluots	10,400	32	10,432
Pomegranates	4,220	43	4,263
Prunes-Dried Plums	3,450	61	3,511
Quince	128	0	128
Walnuts	36,500	1,390	37,890
Miscellaneous [c]	35	9	44
Total Grapes	62,200	2,328	64,528
Total Orchard Crops	182,197	10,526	192,723
Grand Total	360,707	15,020	375,727

[a] Includes Tangor

[b] Includes Citron, Kumquat, and Lime

[c] Includes Chestnuts, Figs, Guava, and Jujubes

Nearly all permanent planting crops are gaining acreage. Many of these bearing acres may still be young and not producing nearly as much as mature plantings are. There is a highly visible shift around Tulare County from Field Crops to Permanent Plantings.

FIELD CROPS

Crop	Year	Harvested Acreage	Production Per Acre	Total	Unit	Value Per Unit	Total
Alfalfa - Hay	2013	82,200	8.75	719,000	Ton	233.00	167,527,000
	2012	101,000	8.42	850,000	Ton	217.00	184,450,000
- Silage[a]	2013	X	2.20	121,000	Ton	66.70	8,071,000
	2012	X	3.96	267,000	Ton	57.80	15,433,000
Barley - Grain	2013	6,470	2.60	16,800	Ton	238.00	3,998,000
	2012	5,050	2.00	10,100	Ton	264.00	2,666,000
Beans - Dry	2013	8,180	1.64	13,400	Ton	1030.00	13,802,000
	2012	9,140	1.68	15,400	Ton	1050.00	16,170,000
Corn - Grain	2013	9,340	6.98	65,200	Ton	237.00	15,452,000
	2012	12,800	6.00	76,800	Ton	272.00	20,890,000
- Silage	2013	166,000	28.00	4,648,000	Ton	51.80	240,766,000
	2012	160,000	29.00	4,640,000	Ton	52.00	241,280,000
Cotton - Lint[b]	2013	16,700	1740.00	58,200	Bale	95.00	27,369,000
	2012	20,400	1700.00	70,400	Bale	89.00	31,119,000
- Seed	2013	X	X	23,300	Ton	395.00	9,204,000
	2012	X	X	28,100	Ton	368.00	10,341,000
Hay - other[c]	2013	19,900	2.11	42,000	Ton	90.00	3,780,000
	2012	X	X	X	X	X	X
Pasture & Rangeland	2013	93,000	X	X	Acre	235.00	21,855,000
- Irrigated	2012	93,000	X	X	Acre	162.00	15,066,000
- Native	2013	615,000	X	X	Acre	18.00	11,070,000
	2012	615,000	X	X	Acre	18.00	11,070,000
- Other	2013	70,100	X	X	Acre	25.00	1,753,000
	2012	76,300	X	X	Acre	25.00	1,908,000
Silage - Small Grain[d]	2013	186,000	18.50	3,441,000	Ton	43.40	149,339,000
	2012	168,000	17.00	2,856,000	Ton	42.00	119,952,000
Sudan Grass	2013	12,200	2.64[e]	32,200	Ton	130.00	4,186,000
	2012	13,600	16.1[f]	219,000	Ton	34.20	7,490,000
Wheat – Grain	2013	22,300	2.75	61,300	Ton	280.00	17,164,000
	2012	44,800	3.85	172,000	Ton	265.00	45,580,000
Miscellaneous[g]	2013	37,400	X	X	X	X	20,399,000
	2012	29,000	X	X	X	X	42,425,000
TOTAL	2013	1,344,790					$ 715,735,000
	2012	1,348,090					$ 765,840,000

[a] Green weight basis

[b] Yield per acre in pounds lint; production total in 495 lbs net weight bales; unit value in dollars per lint hundred weight

[c] Includes Oat Hay and Wheat Hay

[d] Includes Barley, Oat, Sorghum, Triticale, and Wheat

[e] Sudan Grass reported as hay

[f] Sudan Grass reported as green chop

[g] Includes Bean screenings, Safflower, Oat Grain, Garbanzo, Corn for Human Consumption, Sorghum Grain, and Straw

From 2012 to 2013 an overall decrease of $50,105,000 was seen in Field Crops. This 6.5% decrease was mainly due to the shift in acreage to Small Grain Silage, which has a lower per unit value than the other crops. The majority of crops that experienced the decrease in acreage also had an increase in value per unit.

FRUIT & NUT CROPS

Crop	Year	Harvested Acreage	Production Per Acre	Total	Unit	Value Per Unit	Total
Almonds - Meats	2013	38,100	1.07	40,800	Ton	6,040.00	246,432,000
	2012	33,800	1.03	34,800	Ton	5,170.00	179,916,000
- Hulls	2013	X	X	74,700	Ton	135.00	10,084,000
	2012	X	X	71,000	Ton	105.00	7,455,000
Apricots	2013	767	5.10	3,910	Ton	1,500.00	5,865,000
	2012	708	4.97	3,520	Ton	1,730.00	6,090,000
Blueberries - Fresh	2013	1,330	2.30	2,070	Ton	5,410.00	11,199,000
	2012	1,340	3.51	4,700	Ton	4,320.00	20,304,000
- Processed	2013	X	X	985	Ton	1,700.00	1,674,000
	2012	X	X	X	Ton	X	X
Cherries	2013	2,520	4.95	12,500	Ton	4,510.00	56,375,000
	2012	2,040	2.81	5,730	Ton	5,320.00	30,484,000
Grapes - Total	2013	62,200	X	X	X	X	984,879,000
	2012	54,360	X	X	X	X	863,043,000
Raisin Varieties	2013	16,600	13.10	X	X	X	X
	2012	15,100	13.10	X	X	X	X
- Canned	2013	X	X	19,600	Ton	371.00	7,272,000
	2012	X	X	17,900	Ton	371.00	6,641,000
- Crushed [a]	2013	X	X	27,700	Ton	260.00	7,202,000
	2012	X	X	19,800	Ton	256.00	5,069,000
- Dried [b]	2013	X	X	14,900	Ton	1,530.00	22,797,000
	2012	X	X	9,560	Ton	1,900.00	18,164,000
- Fresh	2013	X	X	87,300	Ton	1,340.00	116,982,000
	2012	X	X	76,700	Ton	1,440.00	110,448,000
Table Varieties	2013	34,700	16.90	X	X	X	X
	2012	30,000	13.60	X	X	X	X
- Crushed	2013	X	X	60,500	Ton	220.00	13,310,000
	2012	X	X	41,900	Ton	270.00	11,313,000
- Fresh	2013	X	X	526,000	Ton	1,430.00	752,180,000
	2012	X	X	366,000	Ton	1,800.00	658,800,000
Wine Varieties Crushed [c]	2013	10,900	16.20	177,000	Ton	368.00	65,136,000
	2012	9,260	14.80	137,000	Ton	384.00	52,608,000
Grapefruit - Fresh [d]	2013	2,180	12.70	27,700	Ton	607.00	16,814,000
	2012	1,730	13.90	24,000	Ton	566.00	13,584,000
Kiwifruit	2013	2,450	12.50	30,600	Ton	1,710.00	52,326,000
	2012	1,870	3.36	6,280	Ton	843.00	5,294,000
Lemons - Fresh	2013	6,930	12.10	83,900	Ton	894.00	75,007,000
	2012	3,960	12.80	50,700	Ton	958.00	48,571,000
Nectarines - Fresh	2013	11,400	11.80	135,000	Ton	1,740.00	234,900,000
	2012	11,400	8.47	96,600	Ton	1,230.00	118,818,000

Another sharp increase of 43% or a total value of $1,218,016,000 in the total value was experienced in Fruit and Nut Crops. Nuts and kiwifruit saw a large increase in harvested acreage as well as higher prices in per unit value.

FRUIT & NUT CROPS

Crop	Year	Harvested Acreage	Production Per Acre	Total	Unit	Value Per Unit	Total
Olives	2013	12,300	4.68	57,600	Ton	1,000.00	57,600,000
	2012	9,690	3.55	34,400	Ton	1,040.00	35,776,000
Oranges - Navels	2013	76,700	15.50	1,028,000	Ton	666.00	684,648,000
	2012	76,100	13.20	753,000	Ton	698.00	525,594,000
- Processed	2013	X	X	164,000	Ton	75.00	12,300,000
	2012	X	X	251,000	Ton	75.00	18,825,000
Oranges - Valencia	2013	16,600	17.40	241,000	Ton	624.00	150,384,000
	2012	17,000	14.90	152,000	Ton	634.00	96,368,000
- Processed	2013	X	X	47,800	Ton	154.00	7,361,000
	2012	X	X	101,000	Ton	140.00	14,140,000
Peaches - Cling	2013	1,310	12.20	16,000	Ton	350.00	5,600,000
	2012	1,150	13.70	15,800	Ton	317.00	5,009,000
Peaches - Freestone	2013	12,200	11.00	96,300	Ton	1,290.00	124,227,000
	2012	11,300	11.80	99,800	Ton	1,320.00	131,736,000
- Processed	2013	X	X	38,400	Ton	297.00	11,405,000
	2012	X	X	33,300	Ton	287.00	9,557,000
Pears & Asian Pears	2013	199	11.80	2,350	Ton	2,980.00	7,003,000
	2012	172	6.06	1,040	Ton	2,670.00	2,777,000
Pecans	2013	856	0.77	659	Ton	3,770.00	2,484,000
	2012	398	1.25	498	Ton	3,500.00	1,743,000
Persimmons	2013	2,430	9.08	22,100	Ton	1,150.00	25,415,000
	2012	891	4.75	4,230	Ton	1,410.00	5,964,000
Pistachio Nuts	2013	41,300	1.33	54,900	Ton	4,940.00	271,206,000
	2012	30,000	1.60	48,000	Ton	4,040.00	193,920,000
Plums & Pluots	2013	10,400	9.97	104,000	Ton	953.00	99,112,000
	2012	10,100	9.26	93,500	Ton	1,140.00	106,590,000
Pomegranates	2013	4,220	0.84	3,540	Ton	1,120.00	3,965,000
	2012	4,740	7.03	33,300	Ton	1,280.00	42,624,000
Prunes - Dried Plums [e]	2013	3,450	5.38	18,600	Ton	1,580.00	29,388,000
	2012	3,080	3.02	9,300	Ton	1,250.00	11,625,000
Quince	2013	128	8.18	1,050	Ton	1,860.00	1,953,000
	2012	80	2.56	205	Ton	2,140.00	439,000
Tangerines [f]	2013	13,800	5.00	69,000	Ton	1,820.00	125,580,000
	2012	15,400	6.03	92,900	Ton	1,510.00	140,279,000
Walnuts	2013	36,500	1.86	67,900	Ton	3,860.00	262,094,000
	2012	28,900	2.02	58,400	Ton	3,170.00	185,128,000
Miscellaneous [g]	2013	734	X	X	X	X	13,438,000
	2012	945	X	X	X	X	13,753,000
TOTAL	2013	360,974					4,053,422,000
	2012	321,154					2,835,406,000

[a] Includes green weight raisins for distillery materials and juice pack

[b] Combined value reflecting free and reserve tonnage

[c] Wine varieties for juice are included in Miscellaneous

[d] Includes Pomelos and Hybrids

[e] Yield is dry weight basis

[f] Includes Mandarins, Tangelos, Tangor, and Seedless Varieties

[g] Includes Avocados, Apples, Bushberries, Citron, Chestnuts, Figs, Guava, Juice Grapes, Jujubes, Kumquat, Limes, Processed Grapefruit, Processed Lemons, Processed Tangerines, and Strawberries

VEGETABLE CROPS & APIARY PRODUCTS

Vegetable Crops

Crop	Year	Harvested Acreage	Production Per Acre	Total	Unit	Value Per Unit	Total
Broccoli - Processed	2013	1,050	6.80	7,140	Ton	530.00	3,784,000
	2012	1,100	7.00	7,700	Ton	510.00	3,927,000
Cucumbers	2013	167	2.60	434	Ton	747.00	324,000
	2012	187	3.75	701	Ton	600.00	421,000
Sweet Corn	2013	134	5.00	670	Ton	960.00	643,000
	2012	97	5.00	485	Ton	680.00	330,000
Miscellaneous [a]	2013	3,310	X	X	X	X	21,007,000
	2012	2,880	X	X	X	X	15,022,000
TOTAL	2013	4,661					$ 25,758,000
	2012	4,264					$ 19,700,000

[a] Includes Assorted Peppers, Beans- Succulent, Cabbage, Cactus, Daikon, Cauliflower, Cilantro, Collards, Eggplant, Gourds, Herbs, Kale, Lettuce, Melon-Cantaloupe, Melons-Assorted, Mustard, Onions, Peas, Potatoes, Pumpkins, Spinach, Squash, Tomatillos, Tomatoes (Fresh and Processed), Turnips, Watermelon, and Zucchini

The total amount of harvested acreage of Vegetable Crops increased by 397 acres, all per unit prices also showed an increase. Together this lead to an increase in the overall value of $6,058,000 or 30.8%.

Apiary Products

Crop	Year	Production Total	Unit	Value Per Unit	Total
Honey - Orange [a]	2013	13,183,000	Pound	3.33	43,899,000
	2012	10,240,000	Pound	1.79	18,330,000
- Other	2013	1,464,000	Pound	3.85	5,636,000
	2012	1,264,000	Pound	3.41	4,310,000
Beeswax	2013	150,000	Pound	3.17	476,000
	2012	100,000	Pound	3.75	375,000
Pollination [b]	2013	215,000	Colony	118.00	25,370,000
	2012	142,000	Colony	114.00	16,188,000
TOTAL	2013				$ 75,381,000
	2012				$ 39,203,000

[a] From bee colonies registered in Tulare County during the 2012 citrus bloom period

[b] Estimated number of colonies required for adequate pollination

Apiary Products had an increase of $36,178,000 or 92.3%. While pounds of production and number of colonies were the main cause for this large jump, an increase in honey price also contributed.

NURSERY PRODUCTS

Crop	Year	Production Quantity Sold	Unit	Value Per Unit	Total
Citrus & Subtropical Trees	2013	1,000,000	Each	10.90	10,900,000
	2012	1,289,000	Each	7.53	9,706,000
Deciduous Fruit & Nut Trees	2013	914,000	Each	9.05	8,272,000
	2012	829,000	Each	8.77	7,270,000
Grape & Berry Vines	2013	2,105,000	Each	4.10	8,630,000
	2012	4,078,000	Each	2.34	9,543,000
Ornamental Trees & Shrubs	2013	4,329,000	Each	9.23	39,957,000
	2012	4,151,000	Each	9.28	38,521,000
Miscellaneous [a]	2013	X	X	X	3,692,000
	2012	X	X	X	2,330,000
TOTAL	2013			$	71,451,000
	2012			$	67,370,000

[a] Includes Citrus (Buds, Cuttings, & Scions), Christmas Trees, Cut Flowers, Foliage Plants, Irises, Landscape Olive Trees, Turf, and Vegetable Flats

A 6.1% or $4,081,000 increase was observed in Nursery Products. Just as permanent planting acreage is increasing so did the units and price of Deciduous Fruit & Nut Trees. Ornamental Trees & Shrubs also experienced an increase in total value of $1,436,000, this is perhaps indicative of the housing market's slight rebound.

SEED & INDUSTRIAL CROPS

Seed Crops

Crop	Year	Harvested Acreage	Production Per Acre	Total	Unit	Value Per Unit	Total
Cotton – Foundation,	2013	2,140	X	2,980	Ton	395.00	1,177,000
Registered & Certified [a]	2012	3,930	X	5,410	Ton	368.00	1,991,000
Miscellaneous [b]	2013	650	X	X	X	X	3,597,000
	2012	770	X	X	X	X	663,000
TOTAL	2013	650					$ 4,774,000
	2012	770					$ 2,654,000

[a] Not included in total acreage for "Seed Crops"

[b] Includes Wheat, Cowpea, Onion and Lettuce seed.

While Registered & Certified Cotton seed decreased by 1,790 acres, there was a huge increase of $2,934,000 in high dollar Miscellaneous seed. A total overall increase in Seed Crops total value of 79.9% or $2,120,000.

Industrial Crops

Crop	Year	Production Total	Unit	Value Per Unit	Total
Timber harvested	2013	2,997,000	Board Ft.	0.105	315,000
	2012	2,433,000	Board Ft.	0.088	214,000
Miscellaneous [a]	2013	X	X	X	2,196,000
	2012	X	X	X	1,616,000
TOTAL	2013				$ 2,511,000
	2012				$ 1,830,000

[a] Includes Almond Shells, Biomass, and Firewood

Overall Industrial Crops had a 37.2% increase or $681,000. Nearly everything had a per unit value unit increase as well as an increase in the production total, timber had an increase in production of 23%.

Livestock & Poultry

Crop	Year	No. of Head	Total Liveweight	Unit	Value Per Unit	Total
Cattle & Calves	2013	637,000	X	Head	1,080.00	687,960,000
	2012	595,000	X	Head	970.00	577,150,000
Sheep & Lambs	2013	18,800	1,872,000	Pound	1.08	2,022,000
	2012	19,200	1,827,000	Pound	0.90	1,644,000
Hogs & Pigs	2013	60,300	X	Head	188.00	11,336,000
	2012	100,000	X	Head	153.00	15,300,000
Turkeys	2013	356,000	10,247,000	Pound	0.81	8,300,000
	2012	554,000	16,493,000	Pound	0.72	11,875,000
Miscellaneous [a]	2013	X	X	X	X	55,429,000
	2012	X	X	X	X	54,692,000
TOTAL	2013					$ 765,047,000
	2012					$ 660,661,000

[a] Includes Aquaculture, Beneficial Organisms, Chicken Fryers, Ducks, Fryer Chicks, Game Birds, Goats, Mutton, Pullet Chicks, and Turkey Breeders.

A 15.8% increase or $104,386,000 was experienced in Livestock and Poultry in 2013. The per unit value for all species increased. While Cattle & Calves were the only group to show an increase in the number of head marketed. This was primarily due to the drier conditions with less feed available and higher prices for rangeland.

Livestock & Poultry Products

Crop	Year	Production Total	Unit	Value Per Unit	Total
Manure [a]	2013	2,629,000	Ton	4.10	10,779,000
	2012	2,464,000	Ton	1.11	2,735,000
Milk - Market	2013	112,932,000	Cwt.	18.40	2,077,949,000
	2012	112,981,000	Cwt.	16.00	1,807,696,000
- Manufacturing	2013	283,000	Cwt.	19.10	5,405,000
	2012	340,000	Cwt.	18.00	6,120,000
Miscellaneous [b]	2013	X	X	X	1,414,000
	2012	X	X	X	1,478,000
TOTAL	2013			$	2,095,547,000
	2012			$	1,818,029,000

[a] Includes Dairy and Poultry Manure

[b] Includes Turkey Hatching Eggs, Chicken Eggs (Market & Hatching), Goat Milk, and Wool

Livestock and Poultry products had an increase of 15.3% or $277,518,000. While the per unit value's listed all show an increase, manure had nearly a 3x increase as the value for "organic" manure is much higher. Market milk, the most common utilization for milk in Tulare County, had an increase of 15.0% or $270,253,000 even though the production decreased by 49,000 Cwt.

SUMMARY

Commodity	Year	Harvested Acreage	Value
Field Crops	2013	1,344,790	$715,735,000
	2012	1,348,090	$765,840,000
Fruit & Nut Crops	2013	360,974	$4,053,422,000
	2012	321,154	$2,835,406,000
Vegetable Crops	2013	4,661	$25,758,000
	2012	4,264	$19,700,000
Apiary Products	2013	X	$75,381,000
	2012	X	$39,203,000
Nursery Products	2013	X	$71,451,000
	2012	X	$67,370,000
Seed Crops	2013	650	$4,774,000
	2012	770	$2,654,000
Industrial Crops	2013	X	$2,511,000
	2012	X	$1,830,000
Livestock &	2013	X	$765,047,000
Poultry	2012	X	$660,661,000
Livestock &	2013	X	$2,095,547,000
Poultry Products	2012	X	$1,818,029,000
Grand Total	2013	1,711,075	$7,809,626,000
	2012	1,674,278	$6,210,693,000

Million Dollar Products

2013 Ranking		Total Value	2012 Ranking
1	**Milk**	**$ 2,083,354,000**	**1**
2	**Grapes**	**$ 984,879,000**	**2**
3	**Oranges - Navel & Valencia**	**$ 854,693,000**	**3**
4	**Cattle & Calves**	**$ 687,960,000**	**4**
5	**Pistachio Nuts**	**$ 271,206,000**	**7**
6	**Walnuts**	**$ 262,094,000**	**9**
7	**Almonds - Meats & Hulls**	**$ 256,516,000**	**8**
8	**Corn - Grain & Silage**	**$ 256,218,000**	**5**
9	**Nectarines**	**$ 234,900,000**	**13**
10	**Alfalfa - Hay & Silage**	**$ 175,598,000**	**6**
11	Silage - Small Grain	$ 149,339,000	12
12	Peaches - Cling & Freestone	$ 141,232,000	10
13	Tangerines - Fresh	$ 125,580,000	11
14	Plums & Pluots	$ 99,112,000	14
15	Lemons	$ 75,007,000	15
16	Olives	$ 57,600,000	20
17	Cherries	$ 56,375,000	21
18	Kiwifruit	$ 52,326,000	37
19	Honey	$ 49,535,000	23
20	Nursery - Ornamental Trees & Shrubs	$ 39,957,000	19
21	Cotton - Lint & Seed	$ 37,750,000	17
22	Pasture & Rangeland	$ 34,678,000	22
23	Prunes	$ 29,388,000	30
24	Persimmons	$ 25,415,000	36
25	Pollination	$ 25,370,000	25
26	Wheat - Grain	$ 17,164,000	16
27	Grapefruit - Fresh	$ 16,814,000	28
28	Beans - Dry	$ 13,802,000	26
29	Blueberries	$ 12,873,000	24
30	Hogs & Pigs	$ 11,336,000	27
31	Nursery - Citrus & Subtropical Trees	$ 10,900,000	31
32	Manure	$ 10,779,000	40
33	Nursery - Grape & Berry Vines	$ 8,630,000	32
34	Turkeys	$ 8,300,000	29
35	Nursery - Deciduous Fruit & Nut Trees	$ 8,272,000	34
36	Pears & Asian Pears	$ 7,003,000	39
37	Apricots	$ 5,865,000	35
38	Sudan Grass	$ 4,186,000	33
39	Barley - Grain	$ 3,998,000	41
40	Pomegranates	$ 3,965,000	18
41	Broccoli	$ 3,784,000	38
42	Hay - other	$ 3,780,000	N/A
43	Pecans	$ 2,484,000	42
44	Sheep & Lambs	$ 2,022,000	43
45	Quince	$ 1,953,000	N/A

Leading Export Countries

Rank	Country	Cartons	Rank	Country	Cartons	Rank	Country	Cartons
1	**Republic of Korea**	**4,549,220**	26	Peru	194,448	51	Bahrain	10,184
2	**Mexico**	**4,336,964**	27	Honduras	189,479	52	Brunei Darussalam	8,634
3	**Japan**	**3,992,773**	28	Dominican Republic	150,686	53	Poland	8,240
4	**China**	**3,941,394**	29	Israel	147,314	54	Morocco	8,080
5	**United Arab Emirates**	**2,320,510**	30	France	142,475	55	Bulgaria	7,720
6	**Taiwan**	**1,869,590**	31	Brazil	136,514	56	Fiji	7,431
7	**Australia**	**1,262,399**	32	Spain	134,020	57	Egypt	7,224
8	**Hong Kong**	**1,154,240**	33	Panama	134,013	58	Qatar	6,943
9	**Philippines**	**1,012,979**	34	Italy	114,949	59	Norway	5,980
10	**Canada**	**741,257**	35	United Kingdom	102,695	60	Bosnia and Herzegovina	5,520
11	New Zealand	699,735	36	Switzerland	100,934	61	Cyprus	5,281
12	Guatemala	481,224	37	Malaysia	100,429	62	Lithuania	5,280
13	Vietnam	459,691	38	Belgium	92,734	63	Algeria	5,120
14	Thailand	450,542	39	Trinidad and Tobago	74,377	64	Portugal	4,948
15	Indonesia	419,536	40	Cambodia	51,236	65	Lebanon	4,586
16	Netherlands	400,692	41	Saudi Arabia	46,984	66	Greece	4,165
17	Costa Rica	335,004	42	Turkey	45,511	67	Jordan	3,810
18	Germany	319,828	43	Singapore	40,982	68	Aruba	3,449
19	Colombia	280,844	44	Nicaragua	40,735	69	French Polynesia	3,408
20	Russian Federation	280,369	45	Bangladesh	36,446	70	Guyana	2,310
21	India	271,992	46	South Africa	13,605	71	Zambia	1,673
22	Luxembourg	270,960	47	Bolivarian Republic of Venezuela	12,260	72	Romania	1,640
23	Ecuador	249,768	48	Kuwait	11,305	73	Ukraine	1,380
24	Chile	223,437	49	Czech Republic	10,974	74	Denmark	1,260
25	El Salvador	221,087	50	Slovakia	10,560	75	Nepal	1,015

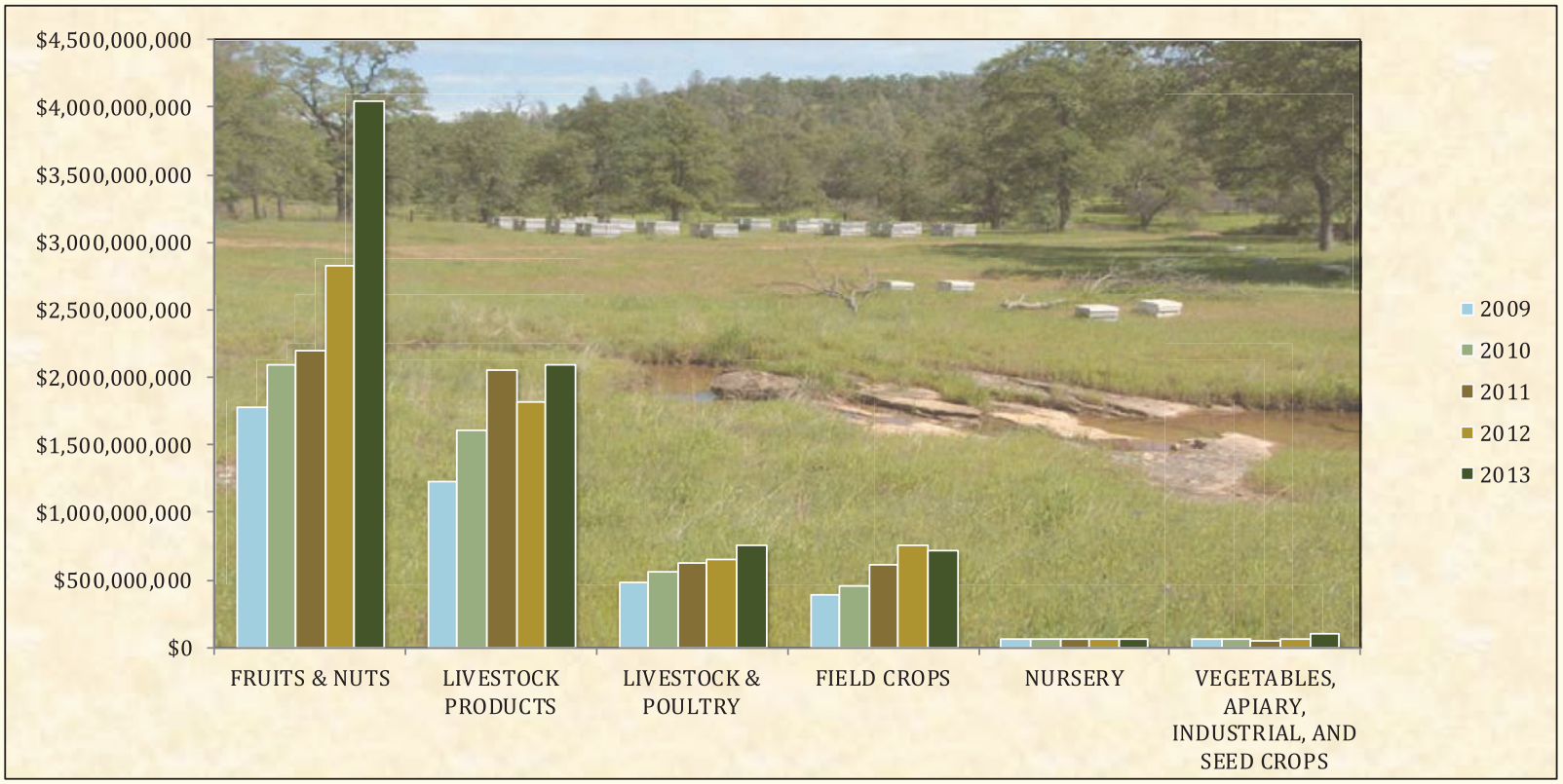
Product of Tulare County

Twenty- Year Comparison of Agriculture Value in Tulare County 1994 - 2013

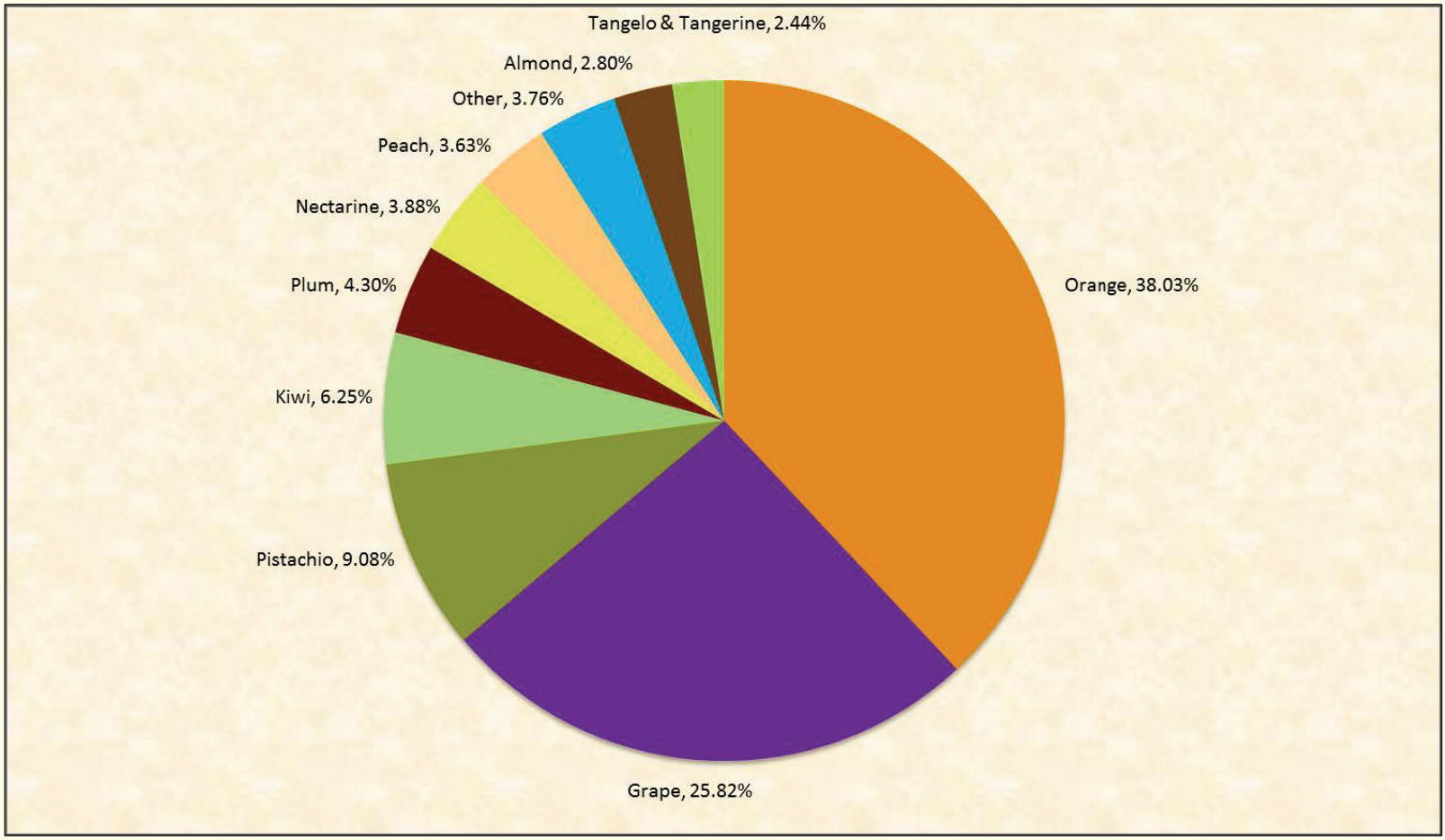
1994	$	2,504,944,000	2004	$	4,039,524,000
1995	$	2,611,088,000	2005	$	4,362,738,000
1996	$	2,805,452,000	2006	$	3,872,059,700
1997	$	2,900,892,000	2007	$	4,874,039,000
1998	$	2,919,528,800	2008	$	5,018,022,800
1999	$	3,078,369,000	2009	$	4,046,447,700
2000	$	3,068,684,200	2010	$	4,863,705,000
2001	$	3,475,999,600	2011	$	5,629,396,000
2002	$	3,201,084,900	2012	$	6,210,693,000
2003	$	3,296,522,000	2013	$	7,809,626,000

Tulare County Twenty Year Comparison

Five-year Category Comparison



2013 Fruit and Nut Exports



Tulare County Sustainable Agricultural Reporting – 2013

County Biological Control

Pest	Agent/Mechanism	Program Scope
Aphids *Aphis* spp.	Asian Ladybird Beetle *Harmonia axyridis*	2 sites
Ash Whitefly *Siphoninus phillyreae*	Parasitic Wasp *Encarsia inaron*	Upon demand
	Ladybird Beetle *Cleitostethus arcuatus*	Upon demand
Comstock Mealybug *Pseudococcus comstocki*	Parasitic Wasps *Pseudoaphycus malinus* *Allotropa burrelli*	Upon demand
Cottony-Cushion Scale *Icerya purchasi*	Parasitic Fly *Cryptochetum iceryae*	Upon demand
	Vedalia Beetle *Rodolia cardinalis*	Upon demand
Italian Thistle *Carduus pycnocephalus*	Seedhead Weevil *Rhinocylus conicus*	2 sites
Milk Thistle *Silybum marianum*	Seedhead Weevel *Rhinoclyus conicus*	Upon demand
Mulberry Whitefly *Tetraleurodes mori*	Ladybird Beetle *Delphastus dejavu*	Upon demand
Puncture Vine *Tribulus terrestris*	Seed & Stem Weevils *Microlarinus lareynii* *Microlarinus lypriformis*	Upon demand
Russian Thistle *Salsola australis*	Casebearer Moth *Coleophora klimeschiella*	Upon demand
Yellow Star Thistle *Centaurea solstitialis*	Flowerhead Bud Weevil *Bangasternus orientalis*	Upon demand
	Flower Weevil *Larinus curtus*	2 sites
	Hairy Weevil* *Eustenopus villosus*	1 site
	Peacock Fly *Chaetorellia succinea*	Upon demand
	Yellow Star Gall Fly *Urophora sirunaseva*	Upon demand

*Also provided insect agents to other out-of-county agencies.

COUNTY PEST DETECTION

Target Pest	Number of Traps	Host Crop
Asian Citrus Psyllid	2,795	Citrus Trees
European Corn Borer	8	Corn/Sorghum
European Grapevine Moth	2,115	Grapevines
European Pine Shoot Moth	10	Pines
General Fruit Fly	505	Fruit Trees
Glassy-Winged Sharpshooter	6,310	Various Trees & Shrubs
Gypsy Moth	200	Shade Trees
Japanese Beetle	146	Turf & Flowers
Khapra Beetle	110	Stored Food Products
Light Brown Apple Moth	479	Various Trees & Shrubs
Mediterranean Fruit Fly	464	Fruit Trees
Melon Fruit Fly	338	Vegetables
Mexican/Caribbean Fruit Flies	223	Fruit Trees
Oriental Fruit Fly	464	Fruit Trees

County Pest Eradication

Pest	Agent/Mechanism	Program Scope
Alligatorweed (*Alteranthera philoxeroides*)	Mechanical/Chemical Control	950 Plants
Pink Bollworm (*Pectinophora gossypiella*)	Mechanical/Chemical Control	16,720 Acres
Scotch Thistle (*Onopordum acanthium*)	Mechanical/Chemical Control	1,600 Plants

County Pest Exclusion

Pest Rejections	Setting	Program Scope
Federally Prohibited Plants	Incoming Shipments	0 Rejection/Destroyed
Improper Markings	Incoming Shipments	7 Rejections/Destroyed
Live Pests (unspecified)	Incoming Shipments	2 Rejections/Destroyed
Invalid Quarantine Certificate	Incoming Shipments	2 Rejection/Destroyed

2013 Registered Organic and Certified Producer Farming Statistics

Organic Growers	94
Acres of Organic Cropland	7,093
Organic Packers/Shippers	16
Certified Producers Certificates	176

Organic Crops

Citrus	1,577 Acres
Grapes	1,277 Acres
Tree Fruits	1,494 Acres
Nuts	478 Acres
Berries	374 Acres
Pomegranates	180 Acres
Vegetables/Melons	82 Acres
Olives	108 Acres
Other	1,523 Acres
Total	**7,093 Acres**

Tulare County Agriculture Commissioner
Sealer of Weights and Measures

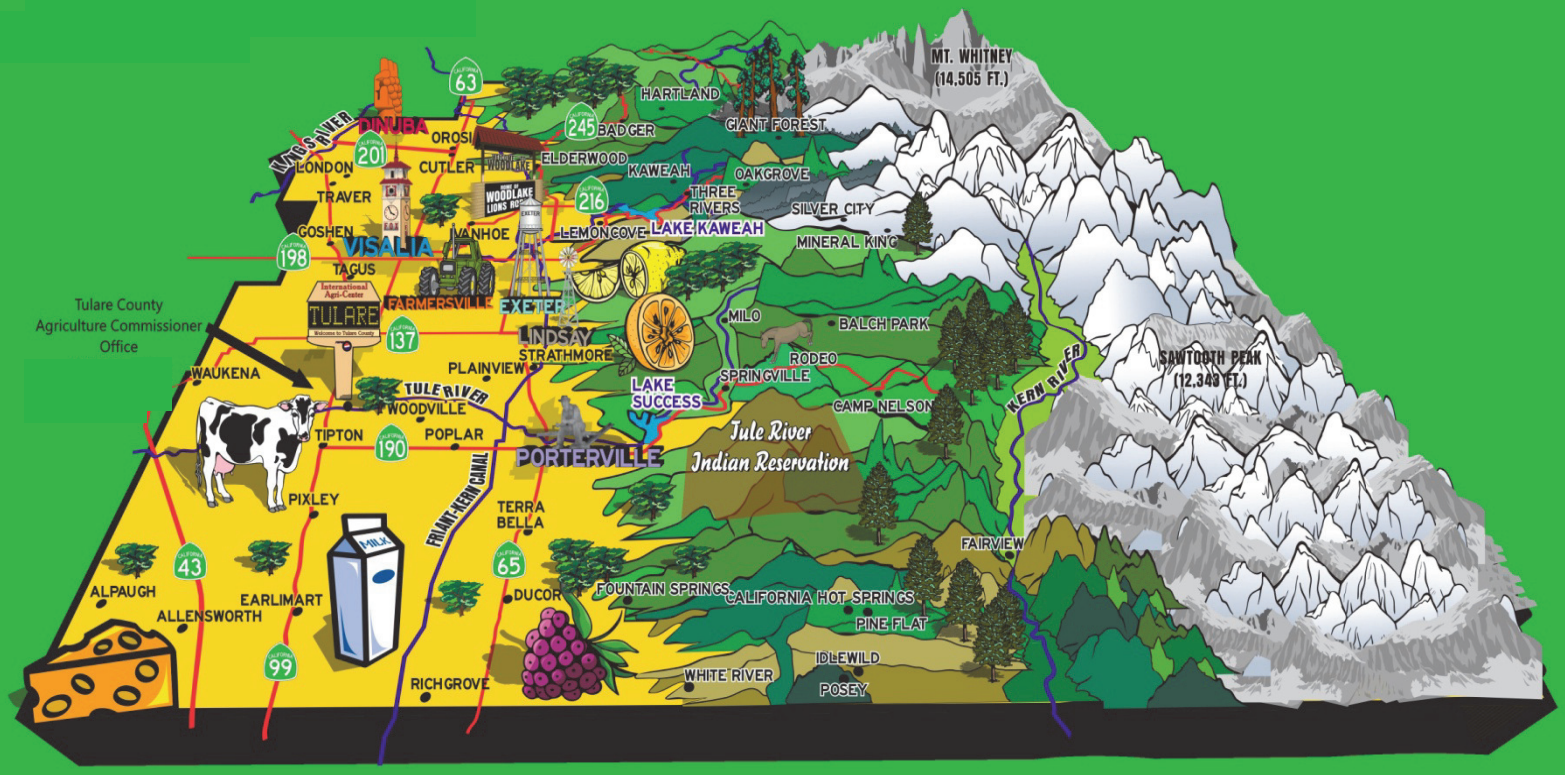
Pesticide Use Enforcement
Pesticide Use Monitoring for
Agricultural & Structural Locations
Apiary Enforcement
Agricultural Wildlife Damage Management
Investigations
Fieldworker Safety

For more information go to:
http://agcomm.co.tulare.ca.us

Pest Detection & Exclusion Division
Pest Exclusion
Pest Detection and Eradication
Nursery and Seed Inspection
Botany and Entomology
Biological Control
Animal Disease Control
Weed and Vertebrate Pest Control

Agricultural Standardization Division
Fruit & Vegetable Control
Fruit Maturity
Freeze Monitoring
Adverse Weather Effect on Commodities
Agricultural Statistics and Special Reports

Weights & Measures Division
Weighing Devices, Measuring Devices
Quantity Control of Packaged and Bulk Commodities
Enforce the Quantity, Advertising and
Labeling for Petroleum Products
Weighmaster Enforcement



Tulare County Agricultural Offices

TULARE (Main)	4437 S. Laspina St, Suite A	(559) 684-3350
DINUBA (1)	324 W. Tulare Ave, Suite 102	(559) 591-5842
DINUBA (2)	324 W. Tulare Ave, Suite 102	(559) 591-5855
EXETER	101 W. Pine St.	(559) 592-4075
LINDSAY	240 E. Honolulu	(559) 562-6025
PORTERVILLE	75 W. Olive, Suite D	(559) 782-6811
WOODLAKE	250 Antelope, Suite L	(559) 564-8320

Photography courtesy of: Dennis Haines, Judy Brant, Lea Periera, Mindy Clisso, Nicole Steggall

MANAGEMENT PLAN PROGRAM

PART 1 – PROGRAM OVERVIEW
PART 2 – PROGRAM ELEMENTS
PART 3 – MANAGEMENT PLAN

KAWEAH RIVER SUB-WATERSHED

SOUTHERN SAN JOAQUIN VALLEY WATER QUALITY COALITION

JUNE 2013

Kaweah & St. Johns Rivers Association

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KAWEAH RIVER SUB-WATERSHED

KAWEAH & ST. JOHNS RIVERS ASSOCIATION

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MANAGEMENT PLAN PROGRAM

KAWEAH RIVER SUB-WATERSHED

KAWEAH & ST. JOHNS RIVERS ASSOCIATION

PART 1
PROGRAM OVERVIEW
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

PURPOSE

On January 25, 2008, the Central Valley Regional Water Quality Control Board (Regional Board) adopted Monitoring and Reporting Program (MRP) Order No. R5-2008-005 (Order). The Order required the preparation and implementation of a management plan to address multiple exceedances of monitored water quality standards that occurred within a three-year period at any established monitoring location.

Overall, the Kaweah & St. Johns Rivers Association (Rivers Association) has utilized twelve (12) monitoring locations during Irrigated Lands Regulatory Program (ILRP) compliance activities for the Kaweah River Sub-watershed (Sub-watershed). The approximate location of each of the monitoring sites are presented on Figure 1-1. Monitoring completed between 2006 and 2010 determined the need for management plans at ten (10) locations. The Order established eight (8) requirements associated with a management plan:

1. Identification of irrigated agriculture source;
2. Identification of management practices to be implemented;
3. Management practice implementation schedule;
4. Management practice performance goals and schedule;
5. Waste-specific monitoring schedule;
6. Evaluation of management practice and schedule;
7. Identification of management plan participants; and
8. Routine reporting schedule.

The Rivers Association developed its Management Plan Program to describe information related to the elements to be used in the development and implementation of required management plans within the Kaweah River Sub-watershed (Sub-watershed). The Management Plan Program consists of three (3) parts which are briefly described below:

a) Part 1 (Program Overview) describes monitoring locations, participants and implementation of the management plans;

b) Part 2 (Program Elements) describes the elements used to develop and implement management plans; and

c) Part 3 (Management Plans) compiles and summarizes all management plans and updates currently in effect for monitoring locations within the Kaweah River Sub-watershed.

The Rivers Association considers its Management Plan Program a dynamic approach that will be modified as conditions dictate or on an annual basis, at a minimum.

SUB-WATERSHED CONSIDERATIONS

General

The Sub-watershed lies on the valley floor and contains numerous seasonal waterways and distributaries. In general, these waterways originate downstream of Terminus Dam (Lake Kaweah) and fan out across the Sub-watershed. The waterways ultimately drain to the Tulare Lake bed. The Sub-watershed experiences a lack of year-round surface water flows. Water flows occur seasonally and consist of releases for irrigation deliveries, flood waters, storm water flows and return flows from agricultural discharges.

The Sub-watershed is segmented into three (3) geographic areas that delineate the primary monitoring areas. These are Cross Creek, Kaweah River and Elk Bayou. Cross Creek flows through the northern portion of the Sub-watershed and includes some of the Sub-watershed's most agriculturally

intensive areas. The Kaweah River and its distributaries flow throughout the central portion. The downstream reaches of the Kaweah River and its distributaries flow through urban areas, thereby limiting monitoring opportunities. Elk Bayou flows through the southern portion of the Sub-watershed surrounded by a diverse range of agricultural land uses. Figure 1-2 shows the geographic delineation of the Sub-watershed.

Land Use

Table 1-1 summarizes general land use information for the Sub-watershed. A significant majority of the acreage is in irrigated agricultural production. Table 1-2 provides a general break-down of the agricultural land uses within the Sub-watershed. Citrus, deciduous fruit and nuts represent the largest components of specific agricultural crops within the Sub-watershed. Table 1-3 summarizes the agricultural practices utilized by general land use and crop types. Figure 1-3 illustrates the distribution of land use categories within the Sub-watershed.

TABLE 1-1
COMPARISON OF LAND USE DATA
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

Land Use Category	1958 [1] (acres)	1968 [2] (acres)	1981 (acres)	1991 (acres)	1996 (acres)	2007 [6] (acres)
Irrigated	224,800	255,900 [3]	263,255	266,313	278,555	268,489
Idle or Fallow (including roads and canals)	39,100	27,900 [3]	15,968	10,470	8,895	3,082
Urban	7,500	10,700	21,352	30,735	29,815 [4]	48,977
Farmsteads	3,500	4,500	10,397	10,129	12,008	13,186
Undeveloped	61,800	37,700	28,833	22,404	9,723	2,827
Totals:	336,700	336,700	341,786 [5]	342,042 [5]	340,992 [5]	346,428

(1) By USBR and DWR.

(2) By KDWCD.

(3) Gross area; net cropped area is 245,680 acres.

(4) Available data is not consistent with observed development pattern.

(5) Total area based on GIS output does not equal calculated total. Difference is within 0.5%.

(6) Draft 2007 DWR land use GIS data files. Includes land within Sub-watershed, but outside KDWCD.

TABLE 1-2
COMPARATIVE SUMMARY OF LAND USAGE
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

	1981		1999		2007	
Category of Land Use	Acres	%	Acres	%	Acres	%
Irrigated						
Cotton	94,229	28%	62,295	18%	14,372	4%
Alfalfa	33,977	10%	38,923	11%	37,719	11%
Grain	65,062	19%	87,926	26%	6,883	2%
Deciduous and Nuts	36,502	11%	44,540	13%	47,567	14%
Pasture	8,873	3%	2,954	1%	2,451	1%
Miscellaneous Field	2,911	1%	510	0%	77,637	22%
Sugar Beets	1,869	1%	900	0%	0	0%
Grapes	9,187	3%	29,796	9%	6,843	2%
Citrus	6,337	2%	7,184	2%	71,405	21%
Rice	313	0%	0	0%	0	0%
Truck	3,995	1%	10,872	3%	3,612	1%
	263,255	79%	285,900	84%	268,489	78%
Non-Irrigated						
Urban, Commercial and Industrial	21,352	6%	29,508	9%	48,977	14%
Farmsteads, Dairies, Feed Lots	10,397	3%	13,136	4%	13,186	4%
Idle (Fallow)	13,923	4%	6,958	2%	3,082	1%
Roads, Channel and Canals	2,045	1%	2,433	1%	9,867	3%
Undeveloped	28,833	8%	2,115	1%	2,827	1%
Unknown	246	0%	0	0%	0	0%
Subtotal, Non-Irrigated	76,796	23%	54,150	16%	77,939	22%
Total	**340,051**		**340,050**		**346,428**	

TABLE 1-3
AGRICULTURAL PRACTICES
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

	LAND USE AND CROP TYPES (1)						
	Citrus	Deciduous Fruit and Nuts	Field Crops	Grains and Hay Crops	Pasture Crops	Truck Crops	Vineyards
Soil Type	mostly loam to sandy loam, some clay	sandy loam	loam to sandy loam	fine sandy loam	loam to sandy loam	fine sandy loam	fine sandy loam
Crop Duration	unlimited	unlimited	single season, multiple crop possible	single season, double crop possible	3-5 years or longer before total removal	single season	unlimited
Rotation	none	usually field crop 1-2 years after orchard removal	Rotate into Grain/Hay or Pasture crop	Rotate into Field or Pasture crop	Rotate into Field or Grain/Hay crop for 1-2 years	Rotate to Cotton, Corn, Alfalfa, Grains	none
Tillage	none	light (2)	mechanical cultivation	none	Raking (once per season)	mechanical cultivation	moderate (3)
Cover Crop (4)	none or some	none/some	none	none	none	none	some
Herbicide Application (5)	PRE, POST	PRE, POST	PRE, POST	POST	PRE, POST	PRE, POST	POST
Herbicide Application Method(s)	GROUND	GROUND	AIR, GROUND (BOOM SPRAYER)	AIR	AIR, GROUND (BOOM SPRAYER)	GROUND	GROUND
Pesticide Application Method(s)	GROUND (AIR BLAST)	GROUND (AIR BLAST)	AIR, GROUND (BOOM SPRAYER)	AIR	AIR, GROUND (BOOM SPRAYER)	AIR	GROUND (BOOM SPRAYER, AIR BLAST)
Harvest	Hand	Hand and Mechanical	Mechanical	Mechanical	Grazing	Mechanical, Hand	Hand/ Mechanical
Irrigation System/ Practice(s) (6)	Furrow, Sprinkler, Drip	Flood, Furrow, Sprinkler, Rainfall	Flood, Furrow, Buried Drip, Sprinkler	Flood, Sprinkler, Rainfall - (winter/spring crops)	Flood, Sprinkler, Rainfall	Furrow, Sprinkler, Buried Drip	Furrow, Drip
Drainage System(s)	None, Tail Drain Return	None, Tail Drain Return	None, Tail Drain Return	None, Tail Drain Return	None, Tail Drain Return	None, Tail Drain Return	None, Tail Drain Return

NOTES:
1. Reference Kaweah River Subwatershed Land Use and Crop Type Map for crop location.
2. Nut crops such as almonds, walnuts and pistachios require flat basins between tree rows for harvest.
3. Grape tillage includes formation of raisin drying beds.
4. Cover crop typically consists of native grasses to support beneficial insects during winter and aid in water infiltration.
5. PRE = Pre Emergent, POST = Post Emergent.
6. Irrigation practice can depend upon water source (surface water rights favors furrow, pumped water favors drip).

EXCEEDANCES

General

A water quality exceedance occurs when surface water test results identify constituent or contaminant concentrations higher than established thresholds. The Regional Board established the water quality exceedance thresholds under activities completed through MRP Order No. 2008-0005. Table 1-4 summarizes the current water quality exceedance criteria.

Water Column Toxicity

Water Column toxicity testing is performed as a response-based assessment of water quality based upon test organism survival or growth. MRP Order No. 2008-0005 established a 50 percent or greater reduction in survival/growth as an initial threshold water column toxicity. If this threshold is achieved, toxicity identification evaluations (TIE) are required.

MRP Order 2008-0005 also required the identification of water column toxicity exceedances. If statistical analyses establishes "statistical significance" to any reduced survival or growth, the sample is deemed to be toxic and the event is to be handled as a water column toxicity exceedance. Statistical testing is completed by the water column toxicity laboratory based upon numerical analyses of the water sample and control toxicity results. Statistical testing uses arbitrary (laboratory defined) thresholds to establish test conditions and limitations. Statistical testing does not establish the presence of a toxicant, rather, that there exists a significant difference between the control and the sample, based upon the defined parameters of the statistical tests including the number of samples in the analysis.

TABLE 1-4
EXCEEDANCE THRESHOLDS
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUBWATERSHED
KAWEAH ST. JOHNS RIVERS ASSOCIATION

Constituent	Exceedance Criteria (1)	Units
Physical Parameters/General Chemistry		
Flow	-	cfs
EC	700	umhos/cm
pH	6.5 - 8.3	pH
Dissolved Oxygen	5 (Warm) / 7 (Cold)	mg/L
Temperature	Δ < 5° C	°C
Turbidity	No adv eff. (Variable)	NTU
TDS	450	mg/L
TSS	-	mg/L
Hardness (as CaCO3)	-	mg/L
Calcium	-	mg/L
Magnesium	-	mg/L
TOC	-	mg/L
Pathogens		
Total Coliform	-	MPN/100ml
E. Coli	235	MPN/100ml
Fecal Coliform	200-400	MPN/100ml
Nutrients		
TKN	-	mg/L
Nitrate (+ Nitrite) - N	10	mg/L
Ammonia - N	chart (3)	mg/L
Unionized Ammonia	-	mg/L
Phosphorous	-	mg/L
Orthophosphate - P	-	mg/L
Water Column Toxicity		
Toxicity, minnow	< 50% (2); Statistically Significant Reduction	% survival
Toxicity, water flea	< 50% (2); Statistically Significant Reduction	% survival
Toxicity, algae	< 50% (2); Statistically Significant Reduction	mil./100ml
Toxicity, algae (control)		mil./100ml
Metals		
Arsenic	10 (3)	ug/L
Boron	700	ug/L
Cadmium (Dissolved)	chart (3)	ug/L
Cadmium	chart (3)	ug/L
Copper (Dissolved)	chart (3)	ug/L
Copper	chart (3)	ug/L
Lead (Dissolved)	chart (3)	ug/L
Lead	chart (3)	ug/L
Molybdenum	10 (3)	ug/L
Nickel (Dissolved)	chart (3)	ug/L
Nickel	chart (3)	ug/L
Selenium	5	ug/L
Zinc (Dissolved)	chart (3)	ug/L
Zinc	chart (3)	ug/L

TABLE 1-4 (CONTINUED)
EXCEEDANCE THRESHOLDS
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUBWATERSHED
KAWEAH ST. JOHNS RIVERS ASSOCIATION

Constituent	Exceedance Criteria (1)	Units
Carbamates		
Aldicarb	3	ug/L
Carbaryl	2.53	ug/L
Carbofuran	0.5	ug/L
Methiocarb	5.0	ug/L
Methomyl	0.52	ug/L
Oxamyl	50	ug/L
Organochlorines		
DDD	0.83 (3)	ng/L
DDE	0.59 (3)	ng/L
DDT	0.59 (3)	ng/L
Dicofol	-	ug/L
Dieldrin	0.14 (3)	ng/L
Endrin	36 (3)	ng/L
Methoxychlor	30 (3)	ug/L
Organophosphorus		
Azinphos Methyl	0.01	ug/L
Chlorpyrifos	0.015	ug/L
Diazinon	0.1	ug/L
Dichlorvos	0.085	ug/L
Dimethoate	1.0	ug/L
Demeton-o,s	-	ug/L
Disulfoton	0.05	ug/L
Malathion	0.1	ug/L
Methamidophos	0.35	ug/L
Methidathion	0.7	ug/L
Parathion, Methyl	0.08	ug/L
Phorate	0.7	ug/L
Phosmet	140	ug/L
Herbicides		
Atrazine	1 (3)	ug/L
Cynazine	1.0	ug/L
Diuron	2	ug/L
Glyphosate	700	ug/L
Linuron	1.4	ug/L
Paraquat	3.2	ug/L
Simazine	4.0	ug/L
Trifluralin	5	ug/L

Note:
1. Source of Data: Interim Water Quality Trigger Limits Table (Revised January 26, 2011) - RWQCB.
2. Defined by MRP Order No. 2008-0005; Requires Toxicity Identification Evaluation (TIE).
3. Multiple Criteria - most stringent listed.

MONITORING LOCATIONS

General

The Rivers Association established its initial (Assessment) monitoring sites in July, 2004 and July, 2006. Table 1-5 summarizes information associated with the Assessment sites. Additional monitoring locations (Core) expanded the monitoring in the Sub-watershed in January, 2011. Table 1-6 presents information regarding the Core monitoring locations. Monitoring data associated with these locations enables the Rivers Association to develop water quality trends. Each monitoring location is described below.

Location SP-1 (Kaweah River)

Location SP-1 is located immediately upstream of Oakes Basin at the end of the Kaweah River. The sampling point is just upstream of the bifurcation of the Kaweah River into Mill Creek and Packwood Creek. The site is accessed from Road 158 and is located approximately one (1) mile north of Highway 198.

The Rivers Association selected this site based on its potential to demonstrate if any adverse impacts to water quality have occurred as waters are conveyed in the lower Kaweah River at a site upstream of any urban discharges. The sample location provides a twofold opportunity. First, the location is sited downstream of primarily pasture, field crops and deciduous fruit and nut trees. There are currently no identified agricultural discharges into this stretch of water and, thus, the potential to monitor a known impaired source to determine its downstream impact exists. The sampling point allows for a determination of the existence of any contaminant and, if contamination is found to be present, progressive samples can occur in an upstream fashion to McKay Point and then to Terminus Dam to allow for a determination of the source of contamination. Second, the sample location also establishes baseline water quality for downstream locations.

TABLE 1-5
ASSESSMENT MONITORING SITES
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

LOCATION ID	NAME	GPS COORDINATES		RELATIVE WATERWAY SIZE	PRIMARY CROPS/LAND USE	CONSIDERATION	MONITORING NOTES
		NORTH	WEST				
SP-1	Kaweah River	36.33821	119.22050	Large	Deciduous Fruit & Nuts	Primary Waterway; Upstream of Urban Land Use.	Not monitored 2011, 2012
SP-2	St. Johns River	36.35394	119.28139	Large	Deciduous Fruit & Nuts	Primary Waterway; Upstream of Urban Land Use; Downstream of identified discharge.	
SP-3	Stone Corral Irrigation District	36.45683	119.22334	Medium/ Small	Citrus	Storm water discharge; Agricultural-intensive area.	
SP-4	Cross Creek	36.40727	119.45415	Medium	Field Crops Deciduous Fruit & Nuts (upstream) Citrus (upstream)	Multiple tributary discharges.	Not monitored 2011, 2012
SP-5	Elk Bayou	36.15286	119.31740	Medium/ Small	Field Crops Deciduous Fruit & Nuts	Agricultural return flows.	
SP-6	Goshen Ditch	36.37075	119.42887	Small	Field Crops	Agricultural return flows.	

TABLE 1-6
CORE MONITORING SITES
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

LOCATION ID	NAME	GPS COORDINATES		RELATIVE WATERWAY SIZE	PRIMARY CROPS/LAND USE	CONSIDERATION	MONITORING NOTES
		NORTH	WEST				
CC1	Cameron Creek Upstream	36.31693	119.22460	Large/Medium	Field Crops, Deciduous Fruit & Nuts	Secondary Waterway; Agricultural Water Delivery Return flows.	
CC2	Cameron Creek Downstream	36.28279	119.30566	Large/Medium	Field crops, Deciduous Fruit & Nuts	Secondary Waterway; Agricultural Water Delivery Return flows.	
FD	Foothill Ditch Spill	36.32474	119.07916	Small	Citrus	Agricultural diversion spill water.	
LC	Lewis Creek	36.21094	119.19869	Medium/Small	Field Crops	Agriculture Intensive Area.	
WPD	Persian/ Watson Ditch	36.32640	119.35397	Medium	Deciduous Fruit & Nuts Urban/Residential	Sediment testing only.	
WS	Wutchumna Spill	36.45015	119.21851	Small	Citrus	Agricultural diversion spill water.	

The location of SP-1 and its contributory areas are shown on Figure 1-4. The primary area targeted by the Rivers Association is east of the City of Visalia. Much of the area is shared with the upstream contributory areas for Cameron Creek (Locations CC1 and CC2).

Location SP-2 (St. Johns River)

Location SP-2 is located north of the City of Visalia at the crossing of St. Johns River by Ben Maddox Way. The sampling site is downstream of the bridge crossing, but prior to the diversion dam serving the Modoc Ditch Company headgate. Agricultural land uses upstream of this location consist of fruit and nut trees, field crops and commercial landscape nurseries.

The Rivers Association chose this location to allow for sampling of the impact of the only identified agricultural discharge to the St. Johns River. The sampling site is below the point where the Wutchumna Water Company has operational spill capability into the St. Johns River. Testing of a sample taken at this location, if representative of an operational spill period, would have the capability to demonstrate the presence of any adverse affects of that discharge on this portion of the Kaweah River.

The location of SP-2 and its contributory areas are shown on Figure 1-4. The primary area targeted by the Rivers Association with this choice lies southwest of the City of Woodlake.

Location SP-3 (Stone Corral Irrigation District)

Location SP-3 is located northeast of the community of Ivanhoe along the east right-of-way line of Road 156, just north of the Cottonwood Creek bridge crossing. Location SP-3 is a sampling point designed to test the water quality of Cottonwood Creek, downstream of the Stone Corral Irrigation District's (irrigation District) Storm Water Control Project (Project). The Project collects storm water runoff and perched groundwater collected through existing tile drains installed within the Irrigation District. Agricultural uses upstream of this location primarily consist of citrus crops. Fruit and nut tree

crops are also present.

The Rivers Association selected this location specifically to test the impacts of the discharges from lands within the Irrigation District on the waters of Cottonwood Creek. The monitoring site also tests the water quality of Cottonwood Creek, especially if discharges from the Irrigation District are not present. If flows in Cottonwood Creek were sufficient to reach Cross Creek, the potential impact on that waterway could also be determined.

The site for Location SP-3 and its contributing area are shown on Figure 1-4. The primary area targeted by the Rivers Association lies west of the Friant-Kern Canal and within the boundaries of the Irrigation District. Location SP-3 is located downstream of the operational spill into Cottonwood Creek from Wutchumna Ditch (Location WS). Monitoring at Location WS was initiated in 2011.

Location SP-4 (Cross Creek)

Location SP-4 is located along Cross Creek, approximately 500 feet upstream of the railroad tracks, on the east side of State Highway 99.

The Rivers Association selected this location to test waters in Cross Creek downstream of the introduction of influence from discharges from Kennedy Wasteway, Sand Creek and Cottonwood Creek. These areas are primarily dominated by field, grain and hay crops. Multiple dairies are also located in the contributory sub-watershed. If testing detected contamination at this location, sampling could continue upstream to determine if the source was from the St. Johns River or from one of the contributing Kings River sub-watersheds to the north. If testing detected contamination from a source contributory to the St. Johns River and said contaminant was absent at SP-2, then the source of contamination would likely be located on the River between the two (2) sampling points. Sources of contamination determined to be from one of the northerly tributaries would have to be identified by upstream sampling at discreet locations that divide one stream group from another.

Location SP-4 is often devoid of water, even during a coordinated surface water run. When insufficient entitlement exists for the Lower Kaweah River units to run, the St. Johns River is dry below Road 80 and at times, is dry below Road 108. At these times, Location SP-2 (St. Johns River) is an adequate choice to demonstrate if upstream impacts exist. Additionally, Location SP-3 (Stone Corral Irrigation District) provides monitoring opportunities for the upstream reach of Cottonwood Creek which is tributary to Cross Creek.

The site for Location SP-4 and its contributory area are shown in Figure 1-4.

Location SP-5 (Elk Bayou)

Location SP-5 is located south of the City of Tulare and east of State Highway 99. Agricultural land uses upstream of this location consist of pasture, field crops and dairies. The Rivers Association established this location to reflect the agricultural activities which could contribute return flows to Bates Slough, Outside Creek and Lewis Creek, all of which combine to form Elk Bayou Slough. These waterways flow principally through lands containing pasture and field crops. The sampling point was located easterly of State Highway 99 to avoid potential adverse influences from a number of sources which are not agricultural in nature. These sources include the Tulare Municipal Golf Course, the airport operations associated with Mefford Field and air pollution and weed control measures associated with State Highway 99.

The site for Location SP-5 and its contributory area are shown on Figure 1-4. The primary area targeted by the Rivers Association lies east of the City of Tulare and includes the region downstream of Sample Point Location LC (Lewis Creek).

Location SP-6 (Goshen Ditch)

Location SP-6 is located northwest of the City of Visalia along Avenue 320 between State Highway 99 and Road 68. The sampling site is downstream of the bridge crossing, but prior to the

diversion dam serving the last Modoc Ditch Company headgate. Agricultural land uses upstream of this location consist of field crops, pasture crops and vineyards. Dairies are also present.

Location SP-6 has the capability to reflect the potential impacts of agricultural return flows on diversions for agricultural purposes on users in the lower end of an agricultural water supply system operated and maintained by the St. Johns Water District. The last diversion for reasonable beneficial use for agricultural purposes from Goshen Ditch is at Location SP-6. As the last point of diversion, this location allows for the impacts of agricultural return flows on downstream water users within the Goshen Ditch Company service area, if any, to be determined.

The site for Location SP-6 and its contributory area are shown on Figure 1-4. The primary area targeted by the Rivers Association lies northwest of the City of Visalia. The diversion of water into Goshen Ditch and thence to Location SP-6 is located downstream of Location SP-2 (St. Johns River).

Locations CC1 and CC2 (Cameron Creek)

Locations CC1 and CC2 are located along Cameron Creek south and southeast of the City of Visalia. The locations reflect typical central Kaweah River Sub-watershed agricultural conditions and return flows. Agricultural land uses consist of field crops and fruit and nut crops.

The Rivers Association established the two (2) locations to provide an opportunity for upstream-downstream evaluations for lands associated with Cameron Creek. The potential exists, however, for Cameron Creek flows to be influenced by residential land uses.

The sites for Locations CC1 and CC2 and the contributory areas are shown on Figure 1-4. The primary area targeted by the Rivers Association lies south and southeast of the City of Visalia.

Location FD (Foothill Ditch)

Location FD is located northeast of the City of Exeter and east of State Highway 65. Location FD monitors spill water from an agricultural delivery channel into a seasonal waterway. Agricultural

land uses upstream of this location consist of pasture and orchard crops.

The Rivers Association selected this location to identify potential impacts resulting from a discharge from Foothill Ditch into the Yokohl Creek waterway. Foothill Ditch originates at the Kaweah River and runs south through agricultural-intensive areas. Foothill Ditch crosses Yokohl Creek where there is an opportunity to discharge Foothill Ditch headgate entitlement not being allowed to be stored in Terminus Reservoir and for which there is no immediate irrigation demand within the upstream service area served by Foothill Ditch. The agricultural land uses consist mostly of citrus crops, however, native pasture and rural residences are also present.

The site of Location FD and its contributory area are shown on Figure 1-4. The primary area targeted by the Rivers Association are those lands located adjacent to Foothill Ditch.

Location LC (Lewis Creek)

Location LC is located between the City of Tulare and the City of Lindsay along State Highway 137. The sampling site is located upstream of the highway culvert. Agricultural land uses upstream of this location consist of fruit and nut trees, field crops and citrus orchards. Dairies also exist in the area.

The Rivers Association established this location to assess potential impacts to surface waters of agricultural intensive areas in the southeast region of the Sub-watershed.

The site of Location LC and its contributory area are shown on Figure 1-4. The primary area targeted by the Rivers Association lies northwest of the City of Lindsay.

Location WS (Wutchumna Spill)

Location WS is located northeast of the community of Ivanhoe along Cottonwood Creek, just upstream of Location SP-3 (Stone Corral Irrigation District). Location WS represents a sampling point designed to test the water quality of an agricultural water supply operational spill from Wutchumna Ditch. Agricultural land uses immediately upstream of this location consist of citrus and field crops.

The Rivers Association identified this location to test for impacts associated with agricultural water supply and related spill of released Kaweah River entitlement water. The Wutchumna Ditch originates at the Kaweah River, east of the City of Woodlake. The Wutchumna Ditch runs westward, entering and exiting Bravo Lake in Woodlake and the northerly channel continues until it discharges into Cottonwood Creek at Location WS. The waterway flows through an agricultural-intensive area consisting of mostly citrus crops.

The site of Location WS and its contributory area are shown on Figure 1-4. The primary area targeted by the Rivers Association lies directly east of Road 156.

Location WPD (Persian-Watson Ditch)

Location WPD lies along the combined section of Persian and Watson Ditches, southwest of the intersection of Akers Road and State Highway 198. The sample location is located along the western edge of urban commercial development adjacent to Cypress Avenue upstream of the bifurcation of Persian Ditch. The Persian-Watson Ditch carries surface after it has flowed through the City of Visalia and is diverted from Mill Creek.

Location WPD is used for sediment testing only. The Rivers Association established this location to test for agricultural influences after upstream diversion. Additional urban influences may also be identified.

The site for Location WPD is shown on Figure 1-4. A contributory area has not been specifically identified. If the need to delineate the area arises, it will reflect land downstream of Location SP-1 within the City of Visalia.

PLAN PARTICIPANTS

The Rivers Association represents the Kaweah River Sub-watershed within the Southern San Joaquin Water Quality Coalition. The Rivers Association serves as the lead agency responsible for the

implementation of the Kaweah River Sub-watershed Management Plan Program.

Additional implementation will be completed by agricultural water supply entities and commodity related organizations when identified through site-specific management plans. The members of the Rivers Association represent the majority of the surface water entities within the Sub-watershed. The Rivers Association's members are listed in Table 1-7. Additional potential plan participants are summarized in Table 1-8.

One critical component to the development of a management plan is pesticide usage within the Sub-watershed. The Tulare County Agriculture Commissioner's Office is utilized to provide pesticide use reporting information.

As specific pesticide trends become identified during management plan implementation, additional participation by commodity-based grower groups will be considered. Commodity-based grower groups will be used to facilitate communications regarding management plan activities.

TABLE 1-7
RIVERS ASSOCIATION MEMBERS
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH AND ST. JOHNS RIVERS ASSOCIATION

Consolidated Peoples Ditch Company
Corcoran Irrigation Company
Arie de Jong Family Trust (Harrell)
Elk Bayou Ditch Company
Evans Ditch Company
Farmers Ditch Company
Fleming Ditch Company
Foothill Ditch Company
Goshen Ditch Company
Hamilton Ditch Company
Hawkeye Ditch Company
Jennings Ditch Company (St. Johns Water District)
Kaweah Delta Water Conservation District
Lakeside Ditch Company
Lemon Cove Ditch Company
Longs Canal Company
Mathews Ditch Company
Modoc Ditch Company
Oakes Ditch Company
Persian Ditch Company
Sentinel Butte Mutual Water Company
St. Johns Ditch Company
St. Johns Water Company
Sweeney Ditch Company
Jay te Velde, Jr. & Darlene te Velde Trust (Harrell Ranch)
Tulare Irrigation Company
Tulare Irrigation District
Uphill Ditch Company
Visalia & Kaweah Water Company
Visalia Ranch East (Harrell)
Watson Ditch Company
Wutchumna Water Company

TABLE 1-8
OTHER POTENTIAL PLAN PARTICIPANTS
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH AND ST. JOHNS RIVERS ASSOCIATION

Alta Irrigation District

Exeter Irrigation District

Ivanhoe Irrigation District

Lewis Creek Water District

Stone Corral Irrigation District (Current Participant)

IMPLEMENTATION

General

In order to address inherent variables associated with water quality exceedances and cause identification, the Rivers Association's Management Plan Program establishes three (3) types of management plans for consideration.

The three (3) types of management plans are described as follows:

Type 1: The Rivers Association considers this type of management plan when the source (or sources) and materials causing identified exceedance cannot be identified through the monitoring data and evaluation of same;

Type 2: The Rivers Association considers this type of management plan for exceedance events that have suspected, but not identified sources; and

Type 3: The Rivers Association considers this type of management plan when a specific source of the exceedance can be established by monitoring data and source identification efforts.

The Rivers Association utilizes an assessment-based approach to determine the type of management plan that will be developed and implemented. An assessment of the water quality monitoring data establishes the type of management plan. Figure 1-5 presents the flow chart used by the Rivers Association to assign the type of management plan to be developed for each parameter under consideration. Using the parameter identified with multiple exceedances, the Rivers Association establishes the relationship of the parameter to agricultural sources. Pesticides and nutrients (fertilizers and, in particular nitrate based) can be specifically attributed to agricultural sources. Data trends and identified relationships with other exceedances establish the type of management plan for the parameter.

Multiple exceedances at a monitoring location will be prioritized based upon parameter evaluations and source identification efforts. The higher priority management plan type will govern and drive the primary parameters of the management plan activities. The elements that comprise each type of management plan are described in Part 2 of this Management Plan Program.

Plan Development

Under the Management Plan Program, each management plan will be comprised of the following five (5) elements:

1) Monitoring Data;

2) Source Identification;

3) Communications Program;

4) Management Practices Program; and

5) Implementation.

The Rivers Association uses the monitoring data and source identification elements to establish the target(s) of the management plan and type of management plan. The Management Practices Program Communications Program and Implementation elements describe the activities to be undertaken by the Rivers Association to address the observed exceedances.

Part 2, Program Elements, describes the content of each management plan element, the level of detail regarding each element source identification and data evaluation procedures. Part 3, Management Plans, will contain a compilation of all active and completed management plans for the Kaweah River Sub-watershed.

Schedule

Table 1-9 summarizes the implementation schedule for the Rivers Association's Management Plan Program. Implementation of the Management Plan Program occurs concurrently with monitoring

TABLE 1-9
IMPLEMENTATION SCHEDULE
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

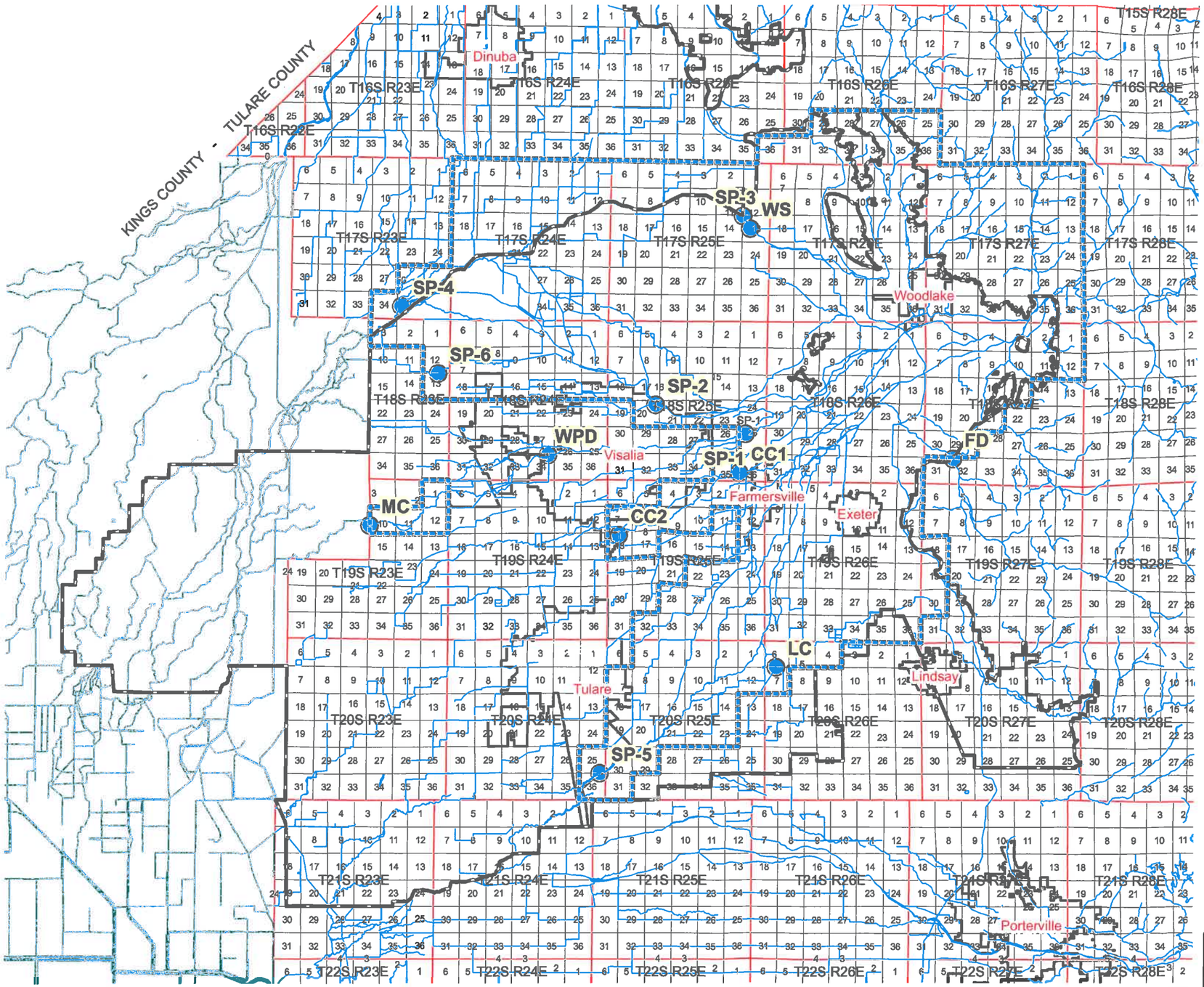
	TASK	DATE
1.	Monitoring and Reporting Program Order No. 2008-0005 - Data Submittals - Annual Report - Exceedance Reports	January, 2013 June/Sept/Dec 2013 March, 2014 As required
2.	Management Plan Program Development Regional Board Approval Initial Implementation	June, 2013 (pending) June, 2013
3.	Management Plans Preparation Existing Management Plans New Management Plans (following new exceedances) - Type 1 Management Plan - Type 2 Management Plan - Type 3 Management Plan Regional Board Approval	June-July 2013 1 month 2 months 3 months (pending)
4.	Management Plan Implementation - Data Evaluation - Management Practice Evaluation - Communications - Reporting	July 2013 – June 2014 Monthly Monthly Monthly Quarterly
5.	Management Plan Assessment/Evaluation - Performance Goals - Management Plan Revisions - Exemption / Waiver Requests - Management Plan Removal	July 2014 (first year) Annually As necessary As necessary As necessary

activities completed under MRP Order No. 2008-0005. Management plans will be implemented annually for a three (3) year cycle. The three (3) year cycle represents the minimum time between observed exceedances. More frequently observed exceedances will require the continuance of the Management Plan Program. In general, implementation will follow the schedule outlined below:

1. Monitoring: Monitoring of the Sub-watershed designated locations will continue under the current MRP Order. At a minimum, parameters subject to Management plans will remain subject to monitoring activities;
2. Management Plan Program: The Program becomes effective in June, 2013, following submittal to the Regional Board. Program elements and subsequent implementation may be amended pending Regional Board review and comment and subsequent approval of the Management Plan Program;
3. Management Plan Preparation: Management plans for parameters demonstrated to have multiple exceedances through calendar year 2012 will be completed by the end of July, 2013. New management plans, or amendments to existing management plans based upon new exceedances, will be prepared as identified. The time for completion will be dependent on the management plan type established by the Rivers Association;
4. Management Plan Implementation: Full implementation of the identified management plans will commence in July, 2013. The Rivers Association, however, preemptively initiated monitoring and communications management plan activities throughout 2011 and 2012. In general, management practices, evaluations and communication efforts will be completed monthly. Reporting will be completed quarterly; and
5. Management Plan Assessment/Evaluations: Management plan effectiveness will be assessed annually with comparisons made to the performance goals. Revisions to each

management plan will be undertaken as required in an effort to achieve the performance goals.

Management plan evaluations may demonstrate that an exemption or waiver request, or removal of management plan requirements, may be warranted. Management plan content, activities and/or subsequent implementation may be amended pending Regional Board review and approval of each management plan(s). Additional parameters that become subject to management plan activities due to observed exceedances during ongoing monitoring will be incorporated into that existing management plan and will be subject to a schedule that matches its assignment.



LEGEND

- AgDischgWvr Year 2011
- SubWtrShed Bndry Polygon 2-04-08
- STREAMS
- twnships
- SECTIONS
- Sample Points

SOURCE: TULARE COUNTY GRAPHICAL INFORMATION SYSTEM, 1999

N
W E
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2 1 0 2 Miles

MONITORING LOCATION SITES
MANAGEMENT PLAN PROGRAM
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

KELLER/WEGLEY

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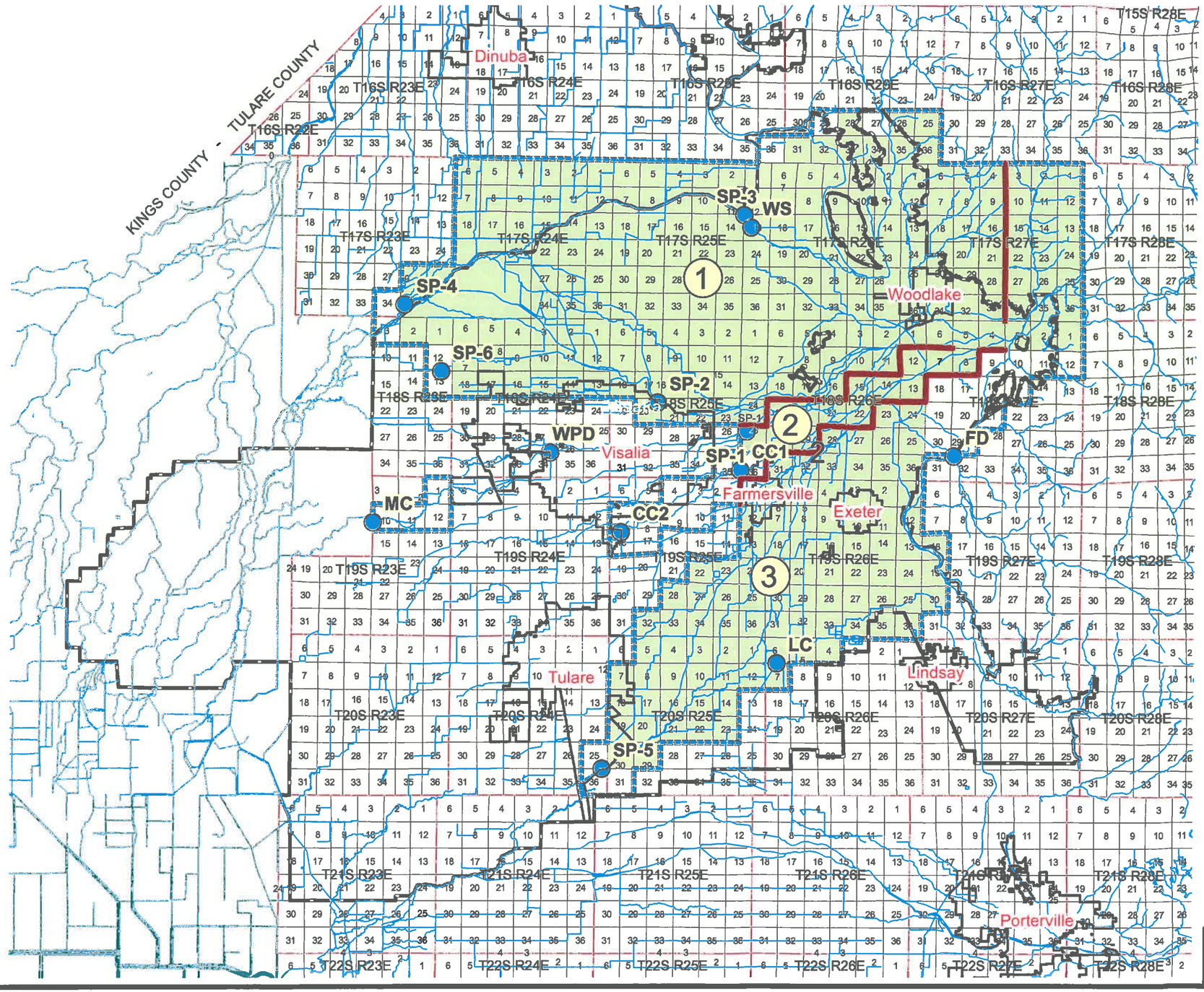

LEGEND

- SegmentLines
- Sample Points
- STREAMS
- SubWtrShed Bndry Polygon 2-04-08
- AgDischgWvr Year 2011
- PesticideData2009
- SECTIONS
- twnships

1. CROSS CREEK
2. KAWEAH RIVER
3. ELK BAYOU

SOURCE: TULARE COUNTY GRAPHICAL INFORMATION SYSTEM, 1999

N W E S

2 1 0 2 Miles

GEOGRAPHIC AREAS
MANAGEMENT PLAN PROGRAM
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

KELLER/WEGLEY

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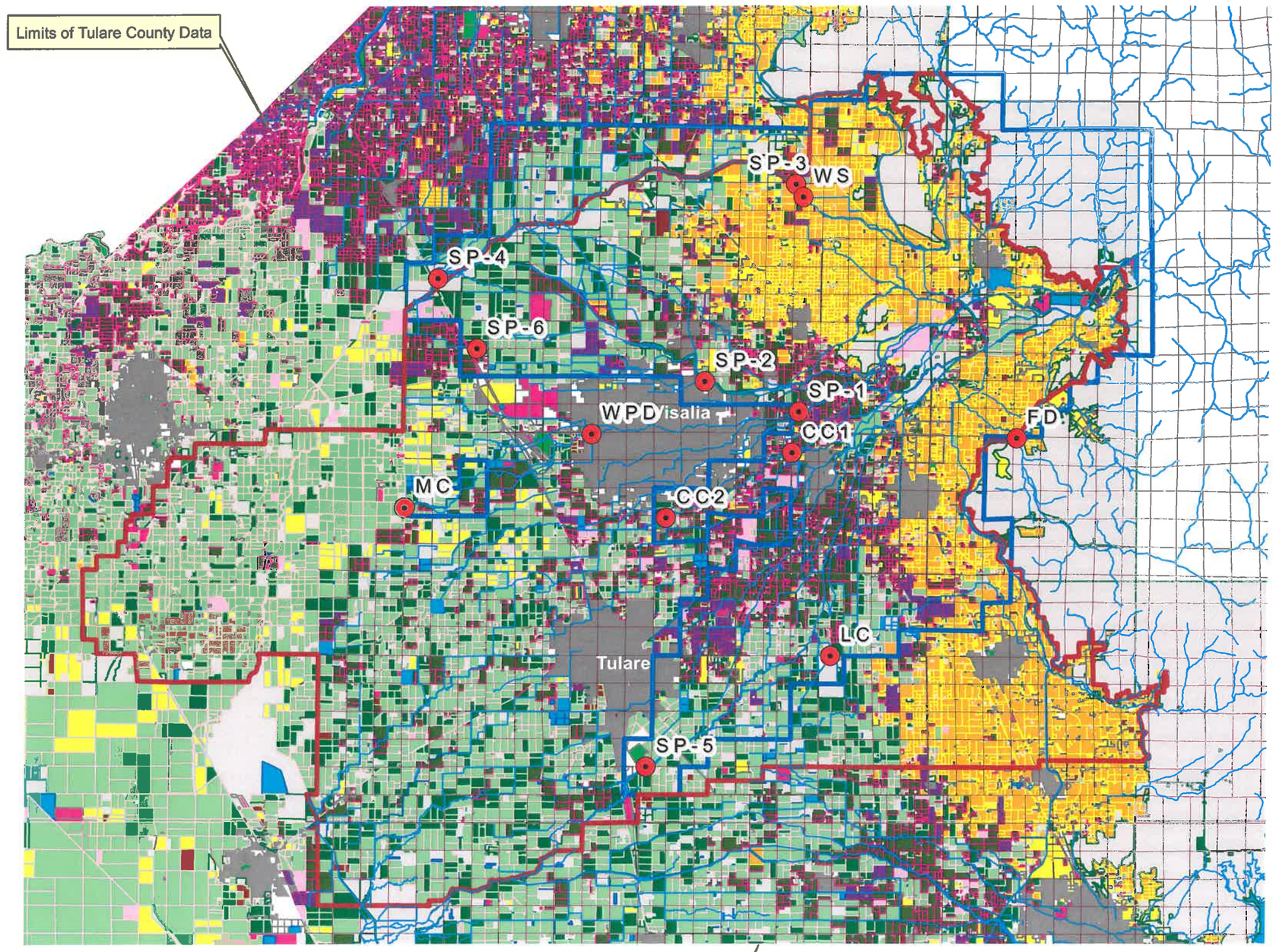

LEGEND

- Monitoring Locations
- Rivers and Streams
- Sub-watershed Boundary
- Limits of Sub-watershed Monitoring (Approximate)
- Citrus
- Deciduous Fruit and Nuts
- Field Crops
- Grains and Hay Crops
- Idle Lands
- Pasture Crops
- Truck Crops
- Vineyards
- Barren & Wasteland
- Native Vegetation
- Water Surfaces
- Semi Agricultural Lands
- Urban
- Urban (Industrial)
- Urban (Landscaping)
- Urban (Residential)
- Urban (Vacant, highway, etc.)

SOURCE: TULARE COUNTY GRAPHICAL INFORMATION SYSTEM, 1999; DEPARTMENT OF WATER RESOURCES, 2007

N
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2 1 0 2 Miles

LAND USE AND CROP TYPES
MANAGEMENT PLAN PROGRAM
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

KELLER/WEGLEY

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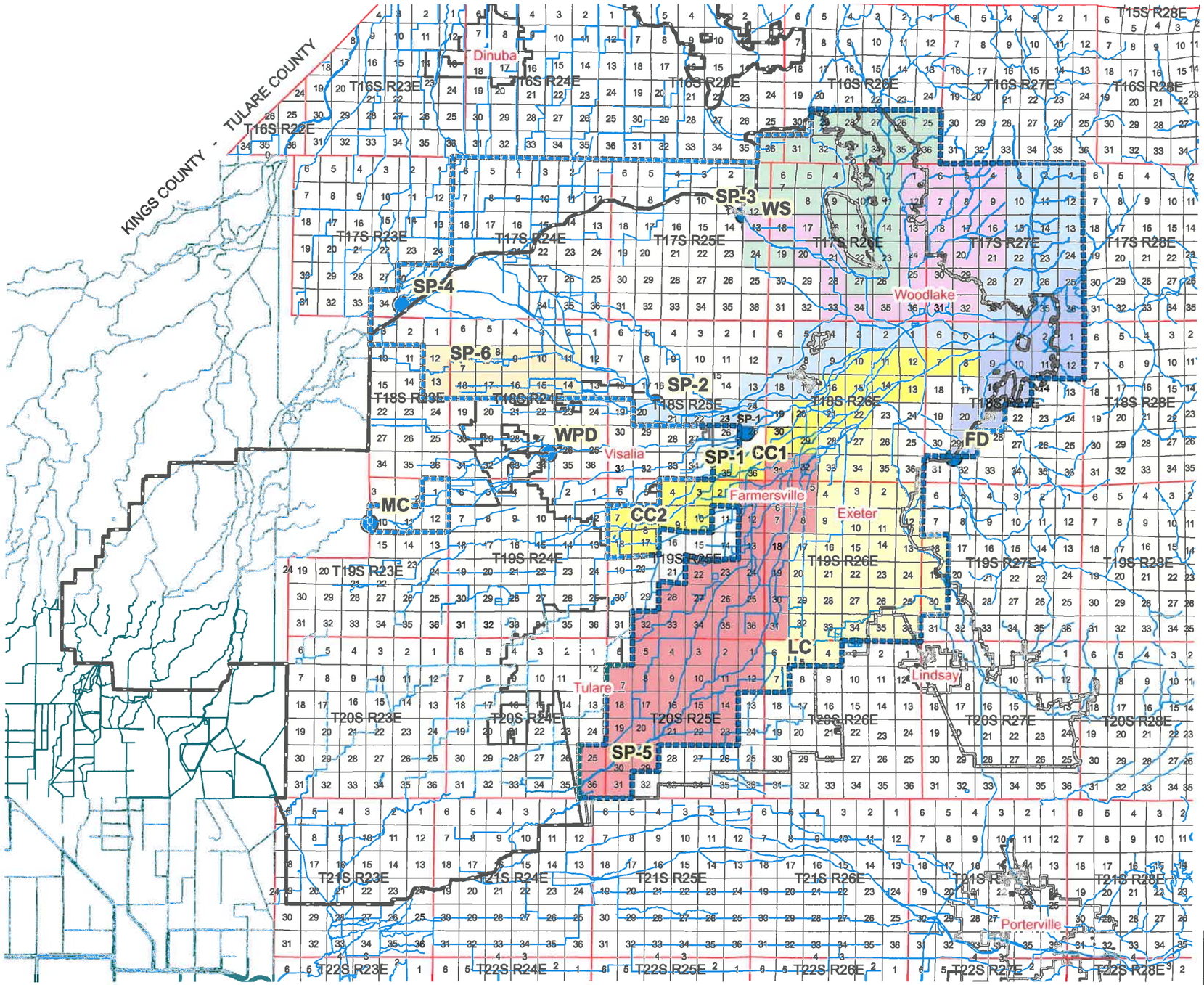

NOTE:
OVERLAP BETWEEN MONITORING SITE LOCATION SUB-WATERSHEDS EXISTS. SEE MANAGEMENT PLANS FOR SPECIFIC SUB-WATERSHEDS.

LEGEND

- AgDischgWvr Year 2011
- SubWtrShed Bndry Polygon 2-04-08
- STREAMS
- twnships
- SECTIONS
- FD_Full
- WS_Full
- SP-2_Full
- SP-3_Full
- CC-2_Full
- LC_Full
- SP-5_Full
- SP-6_Full
- Sample Points

SOURCE: TULARE COUNTY GRAPHICAL INFORMATION SYSTEM, 1999

N W E S

2 1 0 2 Miles

MONITORING LOCATION SITE SUBWATERSHEDS
MANAGEMENT PLAN PROGRAM
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

KELLER/WEGLEY

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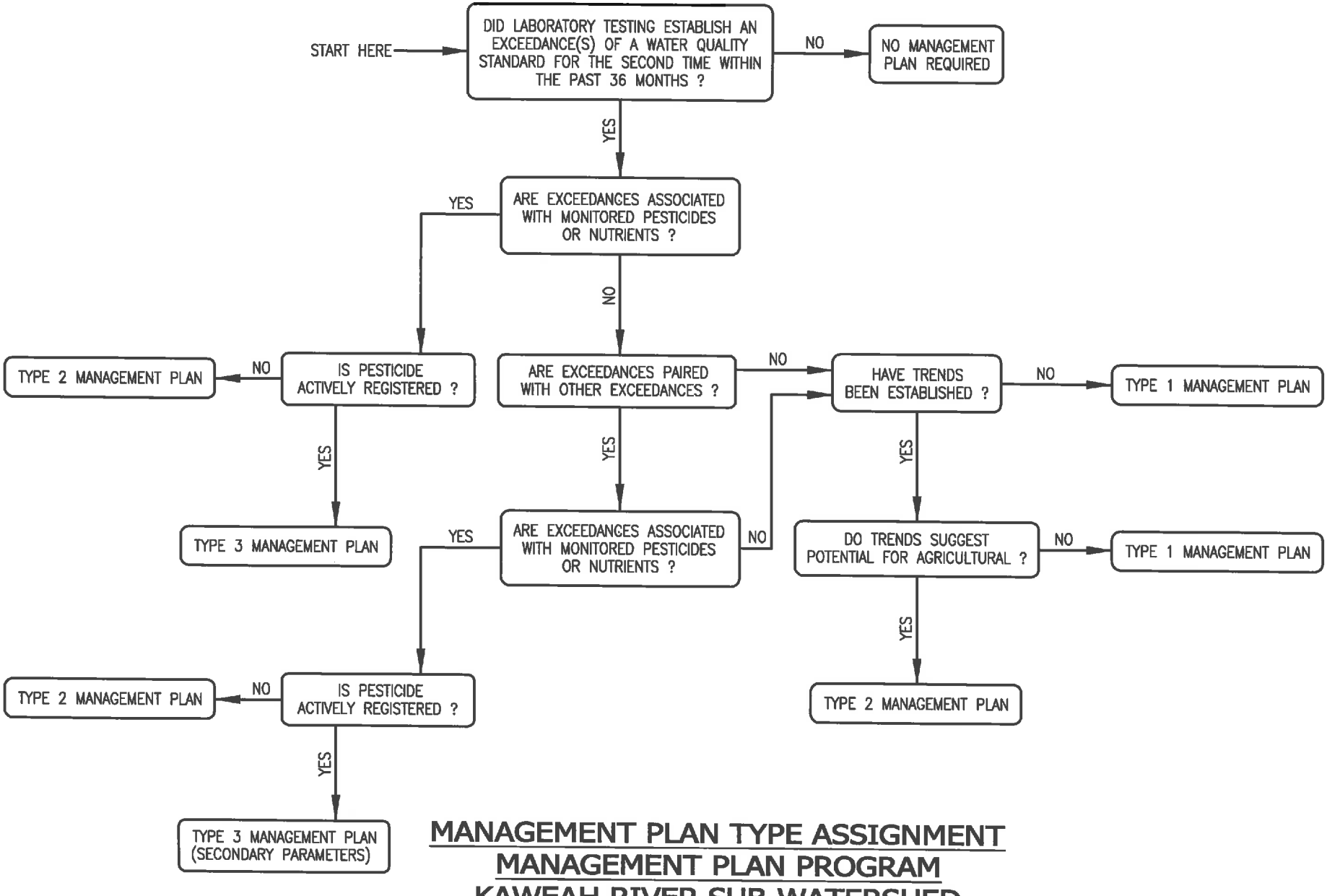
L:\KSJRA\dwg\KSJRA(WQ-S) FIGURE 1-5.Dwg



MANAGEMENT PLAN TYPE ASSIGNMENT
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

KELLER/WEGLEY

FIGURE 1-5

PART 2
MANAGEMENT PLAN PROGRAM ELEMENTS
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

OVERVIEW

The following section provides details regarding the Management Plan Program elements. These elements comprise the primary activities that the Rivers Association anticipates completing to implement a management plan.

A management plan consists of the following five (5) elements:

1) Monitoring data;
2) Source identification;
3) Communications Program;
4) Management Practice Program; and
5) Implementation.

Details regarding the content of each element are described following. The extent of the content for each element will depend on the type of management plan designated by the Rivers Association.

MONITORING DATA

Pursuant to the provisions of Monitoring and Reporting Program Order No. 2008-0005, the Rivers Association compiles monitoring data associated with its established monitoring locations. The monitoring data consists of surface water test results, documented field observations and photographs. The Rivers Association uses the monitoring data to establish water quality trends and patterns associated with documented or statistically significant

exceedances. The Rivers Association uses the information prepared pursuant to this Management Plan Program element for source identification purposes and management practice development.

SOURCE IDENTIFICATION

General

This Management Plan Program element employs land use and pesticide use data with the compiled water quality data to establish a potential source (or sources) of water quality exceedance. The Rivers Association uses the source identification element to direct the Communications and Management Practice Elements of the Management Plan Program.

Pesticide Use Data

Pesticide use data represents the primary tool for source identification. The Tulare County Agricultural Commissioner/Sealer collects and compiles all pesticide use/application reporting data for submission to the California Department of Pesticide Regulation (DPR). Record searches based upon geographic location (Section, Township and Range) generate listings of pesticide applications. Pesticide use evaluations allow for comparison of application dates, locations and active ingredient (pesticide) with water quality data to establish potential sources of identified exceedances. The pesticide use evaluation represents the first step in determining if any connection between irrigated agriculture and the water quality exceedance exists.

Based on the timing of data availability, the Rivers Association completes pesticide use evaluations approximately three (3) months following a water quality sampling event. The delay is principally associated with the time factor associated with pesticide use application data entry by Tulare County staff.

Site Visits/Observations

The Rivers Association conducts site visits, with documented observations, to provide

information regarding field conditions during scheduled water sampling events. Additional site investigations are conducted in response to identified special, localized or complaint based watershed conditions.

Other Resources

Other resources utilized by the Rivers Association include geographical information system (GIS) data including land use inventory information. Land use information establishes crop types and linkages to pesticide use reports. The Rivers Association also uses aerial photographs for additional insight regarding watershed conditions.

Determinations

The Rivers Association uses the pesticide use data, monthly monitoring data and GIS land use data to establish potential sources of water quality exceedances. The determinations that result from source identification efforts will be used to establish the Management Plan type assignment (Type 1, 2 or 3) for the subject monitoring location.

COMMUNICATIONS PROGRAM

General

The Communications Program consists of multiple levels of outreach effort within the Kaweah River Sub-watershed. Each level provides a specific degree of communication that reflects the type of management plan and associated activities.

The Communications Program utilizes the following forms of communication:

1. Group meetings;
2. Individual meetings;
3. Written correspondence;
4. Electronic correspondence; and

5. Direct correspondence such as telephone calls.

Each level of the Communications Program anticipates utilization of combinations of these forms of communication to accomplish the necessary activities.

Sub-watershed Level

Sub-watershed level communications consist of broad Kaweah River Basin stakeholder group communication such as Rivers Association or Coalition focused communications principally through scheduled public meetings. This type of communication serves as the initial outreach effort associated with exceedances to produce awareness of the conditions within the sub-watershed and anticipated subsequent management plan activities.

Contributory Level

Contributory-level communication provides information regarding management plan activities directly to specific water distribution entities or other agencies associated with the monitoring location site contributory sub-watershed. This communication occurs at the broader level through board meetings and direct communication with water distribution entity managers. This type of communication provides initial and/or follow-up outreach to specific areas subject to management plans. The purpose of this communication form is to increase awareness of watershed conditions, promote specific management practices and support efforts directed at management plan implementation.

Source Level

Source-level communication represents the Rivers Association's most specific type of outreach regarding exceedances and management plan activities. This type of communication consists of location specific outreach based upon pesticide use reports, site reconnaissance and water supply entity coordination/input. This element also includes grower education and survey

efforts. Source level communication targets potential sources of exceedance and provides location specific outreach efforts.

Public Meetings and Workshops

Public meetings represent an important component of the Communications Program. Monthly meetings held by the Rivers Association, water supply entity or commodity and/or grower organizations provide regular opportunities to disseminate information regarding management plan activities, including monitoring and management practice considerations.

Public workshops also provide additional opportunities for education and outreach. Workshops represent a format that can be structured to address specific management plan elements such as best management practices (BMPs).

MANAGEMENT PRACTICE PROGRAM

Performance Goals

The Rivers Association has established two (2) primary performance goals for the Management Plan Program. First, management practices need to result in the reduction or elimination of water quality exceedances associated with constituents subject to management plans. Second, management practices need to result in reduced concentrations of identified water quality contaminants, even if at less than exceedance levels. Additional performance goals may be established for individual management plans.

Management Practice Identification

The Management Practices under consideration for the Management Plan Program consist of the following activities:

1. Water quality monitoring;
2. Pesticide use (Registered chemical use) evaluations;

3. Communication efforts, focusing on education and awareness; and

4. Agricultural Best Management Practices (BMPs).

The Rivers Association currently utilizes the following resources for Best Management Practice (BMP) consideration:

1. Best Management Practice (BMP) Handbook by the Center for Urban/Rural Environmental Stewardship (CURES); and
2. Agriculture Pesticide Best Management Practices Report by the University of California, Davis, Agricultural GIS (AGIS) Laboratory (February, 2010).

The most prominent BMPs emphasized by the Rivers Association are associated with communication, education and label restriction compliance.

The Rivers Association employs the tools of public outreach, notification and education associated with agricultural practices. The Rivers Association works primarily with the surface water supply entities and their associated landowners/growers, however, coordination with local Pest Control Advisors also occurs, if possible and/or necessary. The BMPs emphasized by the Rivers Association include:

1. Education and awareness;
2. Chemical application timing; and
3. Chemical handling.

In general, the BMPs follow general practices associated with the manufacturer's label instructions. The Rivers Association's outreach efforts serve to reinforce the manufacturers' label information.

Additional BMP considerations could result from identified conditions that could improve existing water quality conditions not directly related to exceedance conditions. Specific BMP

recommendations could occur to address already identified improvement needs where specific BMP generation efforts take place.

Monitoring Program

General

Under the guidance of each management plan, the Rivers Association utilizes location-specific monitoring to establish trends and evaluate agricultural practices. Monitoring conducted under the Management Plan Program consists of routine monthly monitoring and special testing efforts. The Monitoring Program includes, at a minimum, site visits, observations and photographs. Under the Monitoring Program, the Rivers Association compiles test results for data acquisition and reporting purposes. The Rivers Association utilizes the compiled data for evaluation and trend development purposes.

Monthly Monitoring

Monthly monitoring consists of monitoring procedures conducted by the Rivers Association at locations established by the Monitoring and Reporting Program (MRP). Testing covers constituents required by the MRP. The Rivers Association currently voluntarily monitors additional parameters.

Special Testing

Special testing consists of additional testing conducted by the Rivers Association to specifically support management plan activities. Special testing can include monthly testing of specific locations and/or areas for trend monitoring and source identification. Testing of specific discharges may also occur. The Rivers Association establishes locations for special testing based upon monthly monitoring, data evaluation, site considerations such as land use and pesticide use and potential source investigations.

Targeted Monitoring

The Rivers Association utilizes targeted monitoring procedures to specifically characterize an identified source to or discharge to a monitored waterway. This type of monitoring results from special testing, monitoring data trend development and discreet or reported observations.

Data Summaries

As a part of a management plan, the Rivers Association compiles all monitoring data into summaries for evaluation. The summaries include all required and voluntary testing results. The summaries serve as the basis for trend development and source identification.

Management Practice Implementation

Management practice implementation of BMPs occurs at the farm/discharge site level by individual growers. The Rivers Association utilizes multiple levels of communication and coordination to facilitate implementation of recommended management practices. The initial level of implementation consists of recommendations issued at public opportunities such as water district or water company board meetings or public workshops used to initiate management plan activities.

The Rivers Association's next level of implementation is comprised of targeted correspondence based upon source identification efforts. Commodity groups or location-specific groups of growers represent examples. Finally, site specific visits and/or targeted correspondence occurs if sufficient information exists as a result of source identification efforts.

The Rivers Association utilizes the Tulare County Agricultural Commissioner's Office and the USDA – Natural Resources Conservation Service (NRCS), as necessary, to assist with the facilitation of BMP implementation.

Management Practice Evaluation

The Rivers Association conducts all water quality monitoring required by MRP Order No. 2008-0005. All required monitoring and testing to date remains the responsibility of the Rivers Association. Evaluation of management practices consists of several considerations. The primary consideration of effectiveness centers around water quality exceedances and pesticide detections. The elimination of exceedances represents the primary objective of the management practices. Successful reduction or elimination of exceedances demonstrates management practice effectiveness. Additionally, reduced concentrations of applied materials such as pesticides indicates that the implementation of specific management practices has proven to be effective.

To establish the effectiveness of a management practice, the Rivers Associations reviews water quality monitoring data compiled under routine and/or targeted monitoring efforts. The Rivers Association also reviews pesticide use reports compiled by the Tulare County Agricultural Commissioner for trend comparison.

As evaluations and determinations are completed, the Rivers Associations establishes the need for further management practice implementation. Figure 2-1 illustrates the general evaluation process utilized by the Rivers Association.

IMPLEMENTATION

Schedule

In general, monitoring conducted under a management plan is completed on a monthly basis. Targeted monitoring may require more frequent sampling and testing. Each management plan describes its respective schedule and associated requirements.

Each Management Plan is based initially on a three (3) year schedule. A management plan is assessed/evaluated annually. The Rivers Association renews the schedule as necessary.

Extension of a management plan resulting from conditions such as additional exceedances or lack of trend development are reflected in a revised schedule.

Evaluation

In accordance with its Management Practice Evaluations, the Rivers Association evaluates monthly monitoring data as it becomes available and compares the results to MRP thresholds for exceedance determinations. If necessary, pesticide use information is developed for source identification purposes.

The Rivers Association compares the findings of the evaluations to the management plan's performance goals. The findings determine the need to incorporate additional parameters and/or modifications to the management plan, including additional sampling and testing and/or Best Management Practices.

Three (3) years without an identified exceedance will be used as the basis to demonstrate the effectiveness of the Rivers Association's Management Plan efforts.

Reporting

Reporting under a management plan will consist of the following submittals:

1. Quarterly Data Reports;
2. Exceedance Reports (as required); and
3. Annual Monitoring Reports.

Quarterly management plan data and annual Management Plan Report submittals will be combined with routine MRP submittals. If test results or other management plan activities warrant special consideration, separate reports will be prepared and submitted.

Summary

Table 2-1 summarizes the elements included in typical management plan types prepared

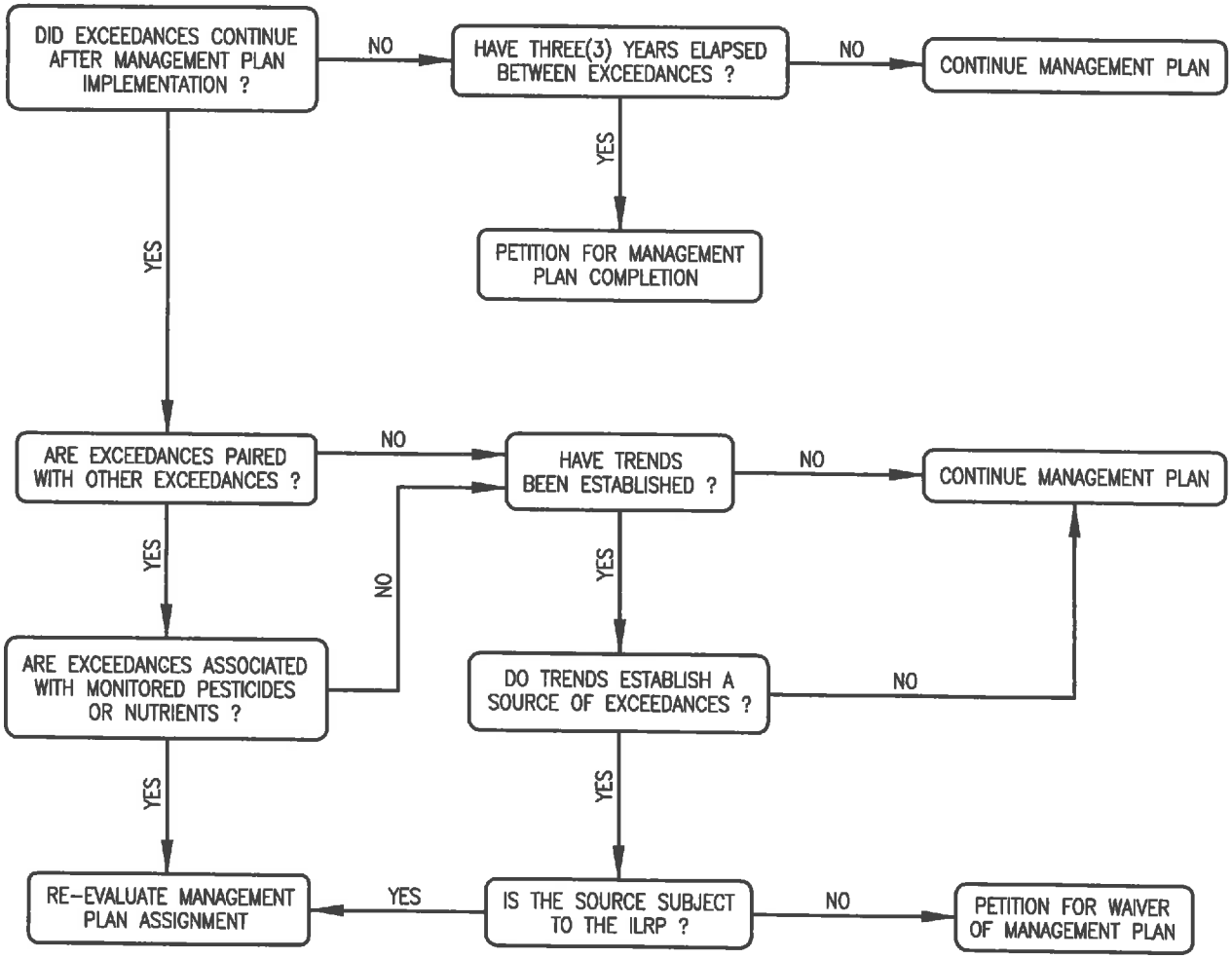
under the Rivers Association's Management Plan Program. Variations may result from specific conditions identified during initial management plan preparation.

TABLE 2-1
MANAGEMENT PLAN ELEMENTS
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

Plan Element	Management Plan		
	Type 1	Type 2	Type 3
MONITORING PROGRAM			
Monthly Monitoring	X	X	(X)
Special Samples		(X)	X
Targeted Monitoring			X
Site Observations and Photos	X	X	X
Data Summaries	X	X	X
Trend Development	X	X	X
SOURCE IDENTIFICATION			
Pesticide Use Data	X	X	X
Pesticide Use Evaluations	(X)	X	X
Land Use/Commodity Considerations			X
Site/Field Investigations			X
COMMUNICATIONS PROGRAM			
Sub-watershed (Rivers Association) Level	X	X	X
Contributory Area (District) Level		X	X
Source (Location) Level		X	X
- General Awareness/Notification		X	X
- Location Specific			X
- Education			X
Public Workshops	(X)	(X)	X
MANAGEMENT PRACTICE PROGRAM			
Performance Goals	(X)	X	X
BMP Identification		(X)	X
Implementation		(X)	X
Evaluation		(X)	X
REPORTING PROGRAM			
Schedule	X	X	X
Data Submittal	Quarterly (with MRP)	Quarterly (with MRP)	Quarterly (Separate Submittal)
Management Plan Update/Summary	Annually (with MRP)	Annually (with MRP)	Annual (Separate Submittal)

Notes:
"X" – Element present in Management Plan.
"(X)" – Element may be included in Management Plan.

L:\KSJRA\dwg\KSJRA(WQ-S) FIGURE 2-1.Dwg



MANAGEMENT PLAN EVALUATION
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

KELLER/WEGLEY

FIGURE 2-1

PART 3

MANAGEMENT PLAN

MANAGEMENT PLAN PROGRAM

KAWEAH RIVER SUB-WATERSHED

KAWEAH AND ST. JOHNS RIVERS ASSOCIATION

PART 3
MANAGEMENT PLANS
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

MANAGEMENT PLANS

This section provides a compilation of all active and completed management plans for the Kaweah River Sub-watershed. Table 3-1 summarizes the active management plans by type.

Updates associated with the Kaweah River Sub-watershed will also be compiled in this section.

TABLE 3-1
SUMMARY OF ACTIVE MANAGEMENT PLANS - TYPE 1
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

Location	Description	Management Plan Parameter(s)	Initial Year	Comments/Update Information
SP-2	St. Johns River	pH Water Column Toxicity - Selenastrum (algae) Water Column Toxicity - Ceriodaphnia (water flea)	2013 2013 2013	Site monitored monthly since November, 2008.
SP-5	Elk Bayou	Water Column Toxicity - Selenastrum (algae) E. Coli Fecal Coliform	2013 2013 2013	Site monitored monthly since November, 2008. Non-irrigated agriculture source. Non-irrigated agriculture source.
CC-1 CC-2	Cameron Creek	Water Column Toxicity - Selenastrum (algae)	2013	Site monitored monthly since January, 2011.
WS	Wutchumna Spill	Water Column Toxicity - Selenastrum (algae)	2013	Site monitored monthly since January, 2011.

TABLE 3-2
SUMMARY OF ACTIVE MANAGEMENT PLANS - TYPE 2
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUB-WATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

Location	Description	Management Plan Parameter(s)	Initial Year	Comments/Update Information
SP-6	Goshen Ditch	pH	2013	Site monitored monthly since November, 2008.
		E. Coli	2013	Non-irrigated agriculture source.
		Fecal Coliform	2013	Non-irrigated agriculture source.
		DDE	2013	Legacy chemical/pesticide.
LC	Lewis Creek	pH	2013	Site monitored monthly since January, 2011.
		E. Coli	2013	Non-irrigated agriculture source.
		Fecal Coliform	2013	Non-irrigated agriculture source.
		Copper	2013	
FD	Foothill Ditch	Copper	2013	Site monitored monthly since January, 2011.
		pH	2013	Secondary parameter.
		E. Coli	2013	Non-irrigated agriculture source.
		Fecal Coliform	2013	Non-irrigated agriculture source.
		Water Column Toxicity - Selenastrum (algae)	2013	
		Water Column Toxicity - Pimephales (minnow)	2013	

TABLE 3-3
SUMMARY OF ACTIVE MANAGEMENT PLANS - TYPE 3
MANAGEMENT PLAN PROGRAM
KAWEAH RIVER SUBWATERSHED
KAWEAH & ST. JOHNS RIVERS ASSOCIATION

Location	Description	Management Plan Parameter(s)	Initial Year	Comments/Update Information
SP-3	Stone Corral I.D.			Site monitored monthly since November, 2008. Discharge-specific testing conducted during January through December, 2010.
		Chlorpyrifos	2013	Special testing initiated in 2012.
		Diuron	2013	Special testing initiated in 2012.
		Simazine	2013	Special testing initiated in 2012.
		Secondary Parameters -	2013	
		pH	2013	
		Electric Conductivity	2013	
		Total Dissolved Solids (TDS)	2013	
		Water Column Toxicity - Selenastrum (algae)	2013	